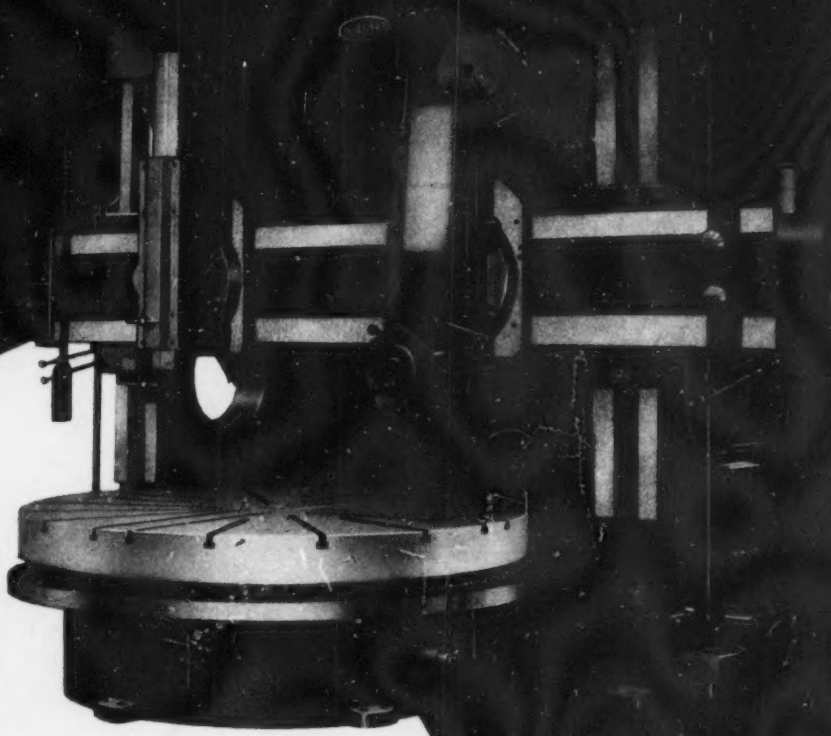
MACHINERY

BROADBENT

VERTICAL BORING and TURNING MILLS

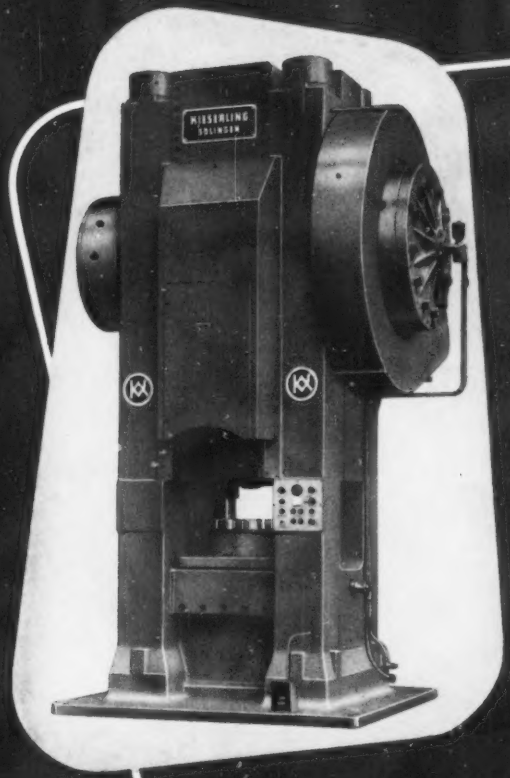


hese are the double column type
d manufactured in sizes 5ft.,
t., 8ft. and 10ft. table diameter.
hey can be supplied with right
d left hand rams, or, if required,
ith pentagon turret on right
nd side. The table is supported
n large diameter white metal vee
earing, and is driven through a
2 speed gearbox.

BROADBENT

HENRY BROADBENT LIMITED
Sowerby Bridge Yorkshire *Telephone Halifax 81331*

A COMPANY IN THE KERRY GROUP



FORGING MACHINES
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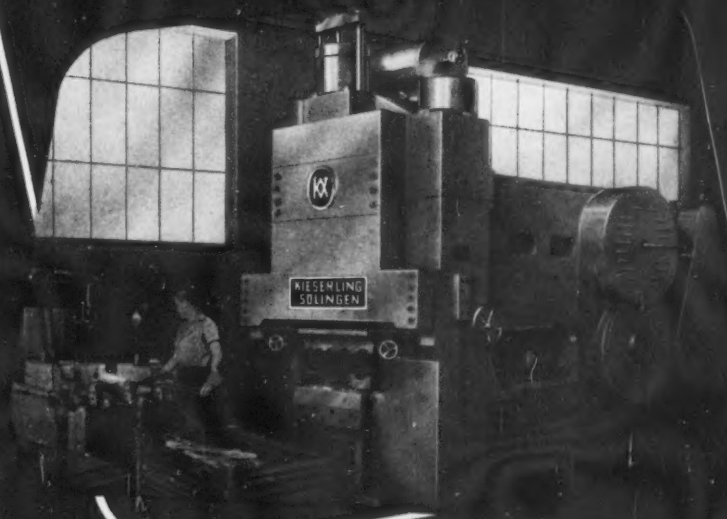
SPECIAL MACHINES

TH. KIESERLING & ALBRECHT SOLINGEN GERMANY

OUR MANUFACTURING PROGRAMME SECTION B

Special Machines for Forging Shops



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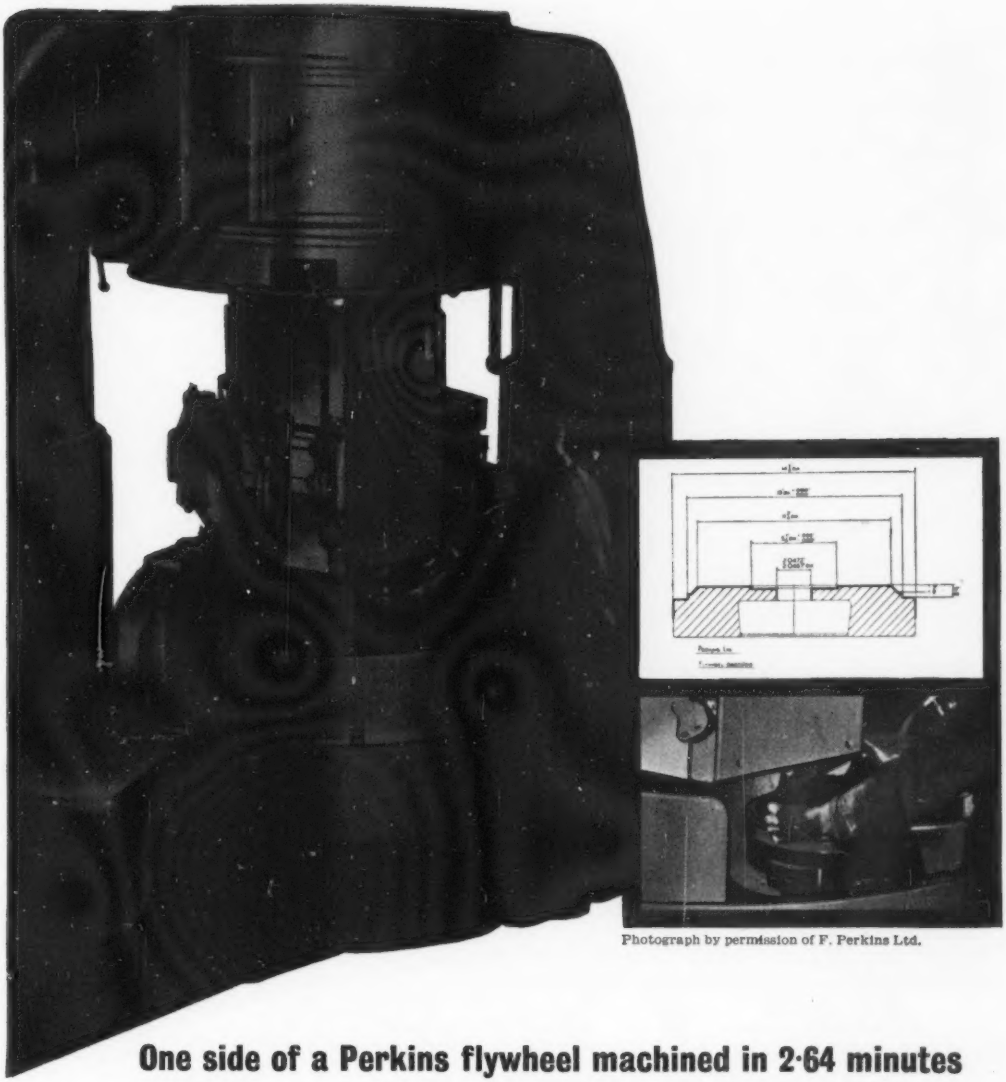

Photograph by permission of F. Perkins Ltd.

One side of a Perkins flywheel machined in 2·64 minutes

This VERTICALAUTO NO. 10 (six-spindle model) is in the flywheel section of F. Perkins Ltd., Peterborough. It maintains a bore tolerance of ·0007", and crankshaft register and starter ring diameters are held within ·002" and ·0015" respectively. There are nine tooling positions and the six 16" hydraulically operated chucks are driven by a 60 h.p. main motor. Eight- and twelve-spindle machines are also available.

Ryder ***VERTICALAUTO***

Thomas Ryder & Son Ltd., Machine Tool Makers, Turner Bridge Works, Bolton, England. Makers also of single spindle Rydermatics and piston ring lathes.

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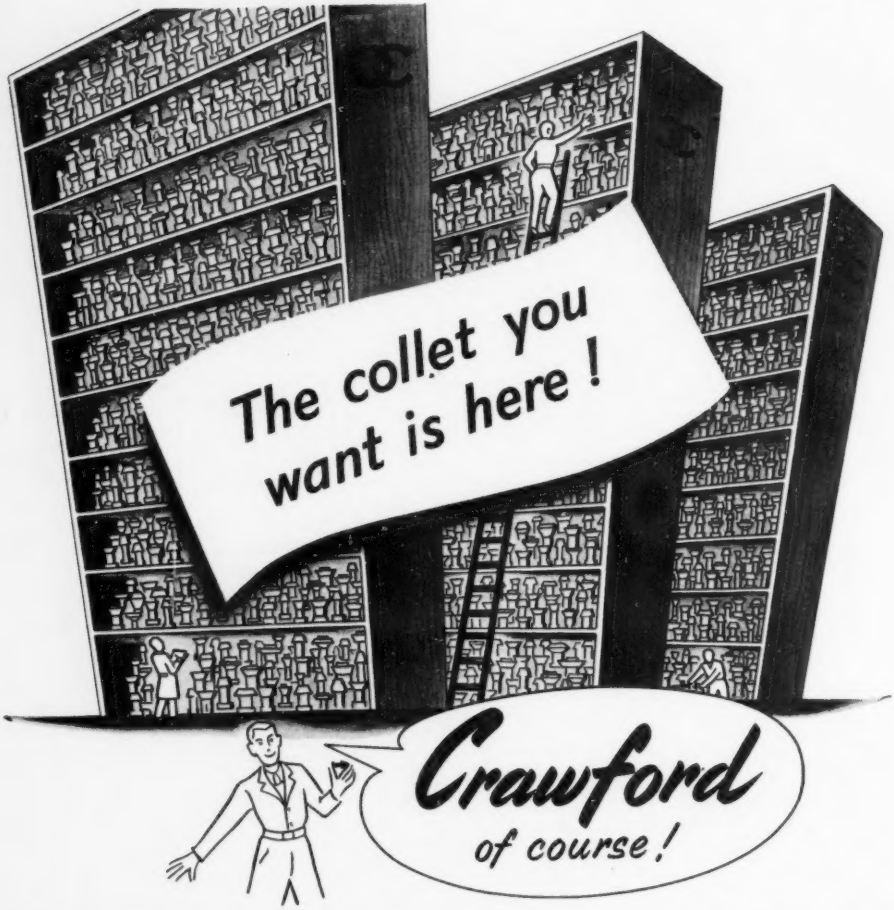

All standard types in stock

. . . for precision lathes, watchmakers lathes, milling machines, drilling machines, etc. Crawfords, specialists in collets for more than sixty years, can supply collets of every size and shape, all standard types being held in stock—and specials can always be made to your specifications. Write now for further details.

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Agents for South-West England & Wales: W. O. Bullock & Sons Ltd., 126, Rodbourne Road, Swindon, Wilts. Telephone: Swindon 6331.
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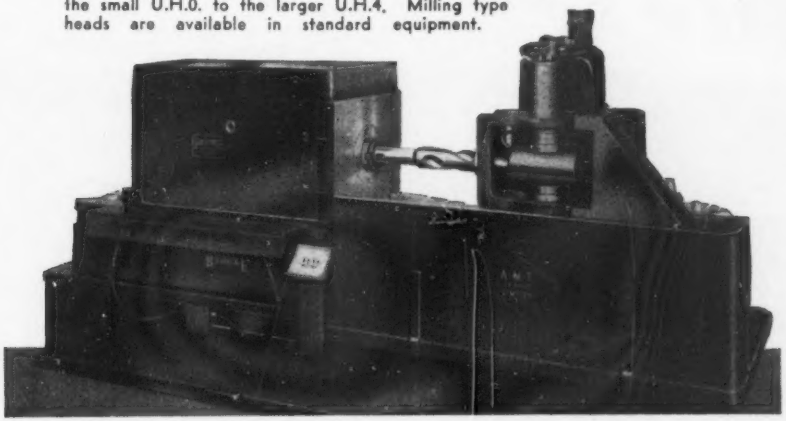
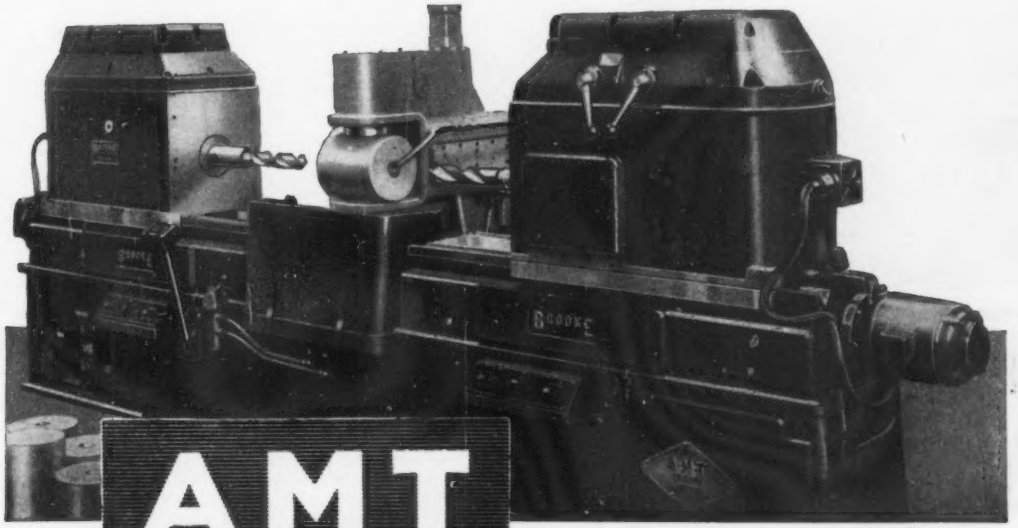
Set-ups for any number and type of Unit Heads from the small U.H.0. to the larger U.H.4. Milling type heads are available in standard equipment.



Single and Double ended
BILLET DRILLING MACHINES



Enquiries are invited and if you have a production problem our Design Engineers will gladly collaborate with you.

DESIGNED AND BUILT FROM STANDARD UNIT PARTS

A.M.T. (B'HAM) LTD., Bournbrook, Birmingham. Tel.: Selly Oak 1128/9/20. Grams: 'Amtold' B'ham.

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THIS IS NEW!

100% ACCURACY AND FINISH

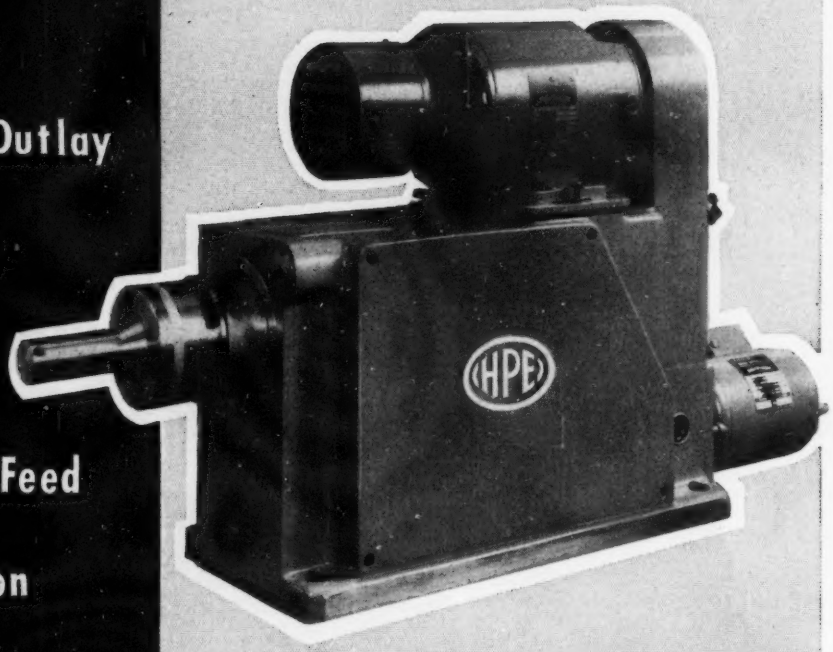
★ Adaptability

★ Low Capital Outlay

★ Space Saving

★ Integral Cam Feed

★ Super Precision Bearings



The FB4F Fine Boring Unit Head illustrated above incorporates an independent feed motion, transmitted to its spindle quill through a simple plate cam, which can be designed to give a fast approach and varying rates of feed. The robust spindle and quill, together with super precision spindle bearings, ensure a high degree of finish and roundness.

These self contained units are readily adaptable for a wide variety of applications without need for costly set ups.

Particularly suitable for mounting on simple base plates together with the necessary work holding fixture enabling single purpose units to be constructed for the minimum of time and cost. Wide range of speeds and feeds obtainable by changing feed cam and motor pulley.

"Descriptive brochure on request."

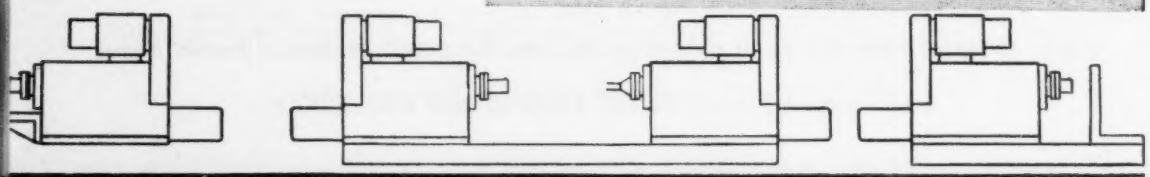
Manufactured by:—

High Precision Equipment Ltd

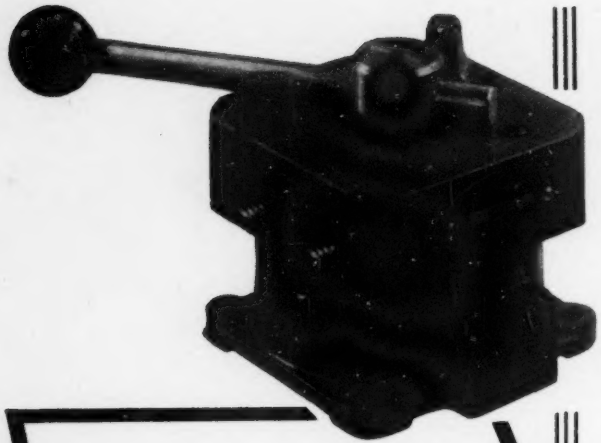
DESIGNERS AND MANUFACTURERS OF SPECIAL MACHINE TOOLS

BLETCHLEY BUCKS

Phone: BLETCHLEY 3403/4/5



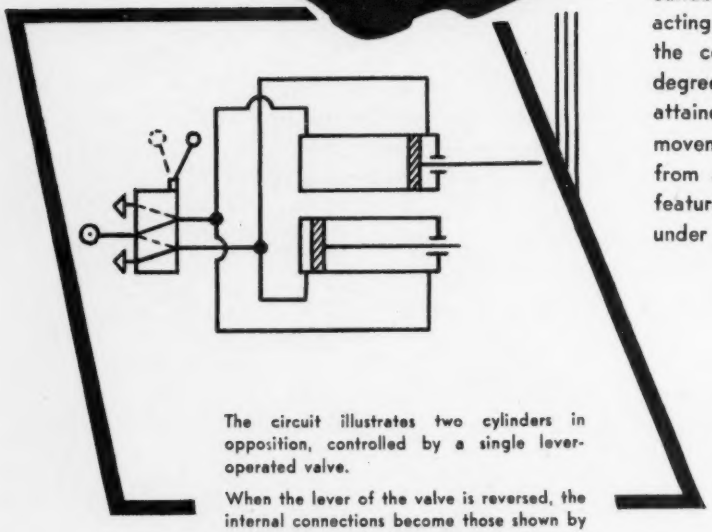
5-PORT PLATE VALVES



The S.808 Plate Valve is available as a lever operated valve in ½" BSP size only. The valve is "fully balanced" and supply air may be connected to any port. All ports are isolated in the mid-position. The exhaust ports are tapped.

The valve is extremely robust and is suitable for heavy industrial applications.

Suitable for the control of double-acting cylinders and similar devices, the construction is such that a degree of flow regulation may be attained by variation of the angular movement of the lever, ranging from a creep to full bore. This feature may be extremely valuable under certain circumstances.



The circuit illustrates two cylinders in opposition, controlled by a single lever-operated valve.

When the lever of the valve is reversed, the internal connections become those shown by broken lines and the upper cylinder will retract at the same time as the lower cylinder out-strokes.

By reversing the connections to either cylinder, the cylinders could be arranged to move in unison instead of opposition.

MARTONAIR LTD., PARKSHOT · RICHMOND · SURREY · ENGLAND

Telephone: RICHMOND 2201 (6 lines)

STOCKS OF PNEUMATIC HOISTS, CYLINDERS, CONTROL VALVES AND ACCESSORIES HELD AT RICHMOND, BIRMINGHAM, GLASGOW, SHEFFIELD, GATESHEAD.

AD.46

SOAG

The fastest way to cut Keyways

WGW

INTERNAL KEYSEATERS

INFINITELY VARIABLE CUTTING SPEEDS ENSURE MAXIMUM PERFORMANCE—REGARDLESS OF SIZE

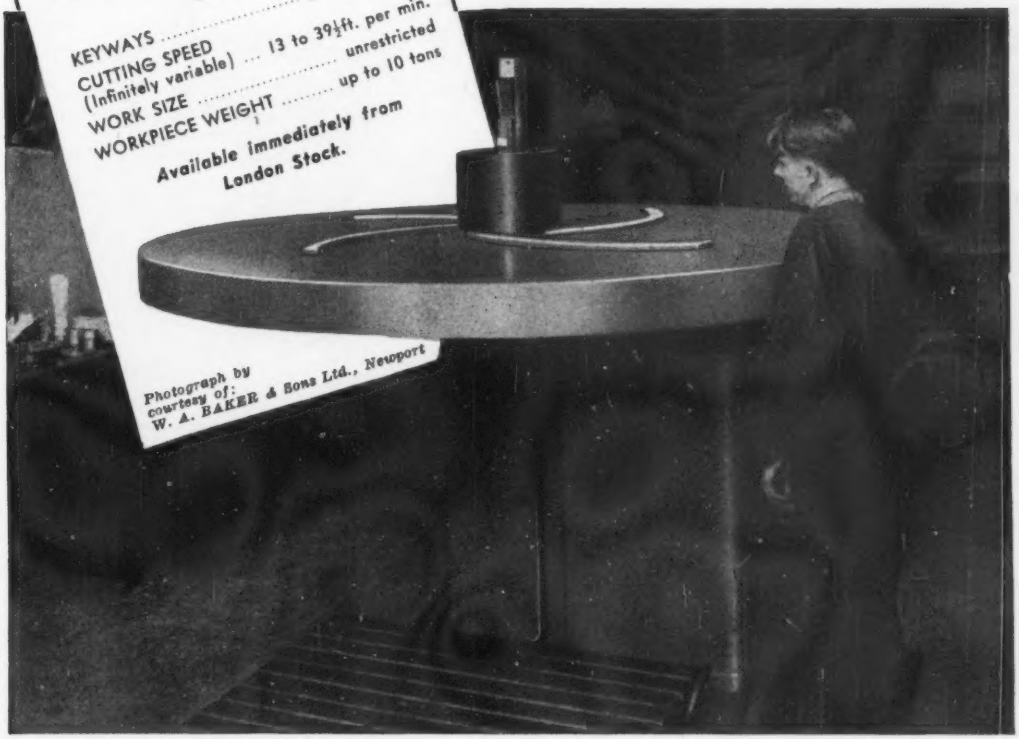
For the rapid and economical cutting of keyways and splines, these machines are unsurpassed. No marking out of parts is required, and several components may be machined at one pass. Tooling is very simple, and provision is made for the cutting of taper keyways and splines. Only a small space is required for the machine, which can carry up to 10 tons in weight, of almost any size.

MODEL NZH 70 as Illustrated

CAPACITY

KEYWAYS ..... ⅛" to 2¼" wide
CUTTING SPEED (Infinitely variable) .... 13 to 39½ft. per min.
WORK SIZE ..... unrestricted
WORKPIECE WEIGHT ..... up to 10 tons

Available immediately from London Stock.



Photograph by courtesy of: W. A. BAKER & Sons Ltd., Newport

Full particulars from the U.K. sole agents:—

SOAG MACHINE TOOLS LTD. **LONDON**
JUXON STREET · LAMBETH · S.E.11
PHONE RELIANCE 7201 · GRAMS SOTOOLSAG, LONDON, S.E.11

IN A CLASS OF ITS OWN

Your Opportunity

TO INSTALL A

GIDDINGS & LEWIS

Model 300 RT

Horizontal Boring, Drilling and Milling Machine

-DIRECT from LONDON STOCK!

with Built-in ROTARY TABLE (30″ x 36″)

and improved measuring device for all 3 directions

★ **Note length at bed and vertical travel of headstock**

BRIEF SPECIFICATION

Dia. of Spindle	3″
Length of Bed	72″
Vertical travel of headstock	45″

Built-in Rotary Table—30″ x 36″ with 36″ cross feed

Equipped with Scales and Verniers as well as improved measuring device using end measuring rods for headstock, table, and saddle movement.

This machine has all the well-known Giddings and Lewis features including—Hardened Bed and Saddle ways, 22″ facing head with telescopic tools, and above all, heavy stock removal coupled with an exceptional degree of lasting accuracy.

ROCKWELL
MACHINE TOOL CO. LTD.

For further particulars write or telephone TODAY

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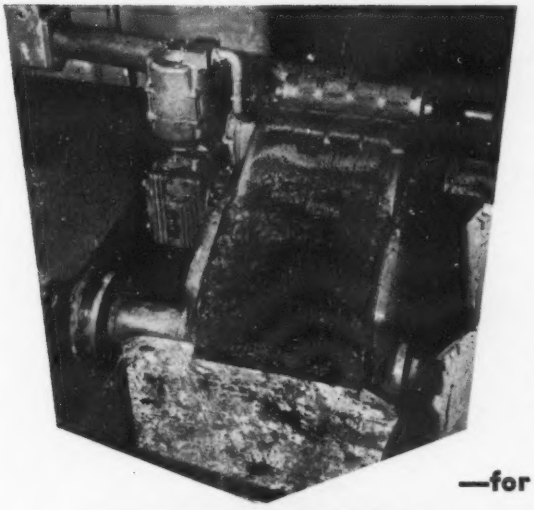
8★

DANGER! *Dirty Coolant*



MEANS

- ➡ **SPOILT WORK**
- ➡ **WORN PLANT**
- ➡ **LOST TIME**

Does your coolant do its job—without harm or loss? The Barnesdril separator gives you clean liquid for re-circulation freed at one pass from all ferrous particles, abrasive and general residue.

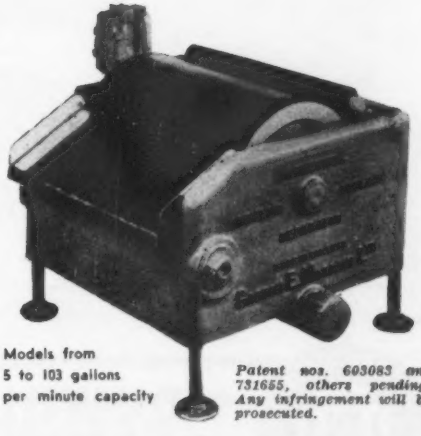
—for CLEAN COOLANT install . . .

BARNESDRIL Magnetic Coolant Separators

- ✔ Powerful magnetic drum screens ALL the liquid.
- ✔ Ferrous swarf build-up collects other residue.
- ✔ Clean coolant gives longer tool life, better finish, less wear.
- ✔ Clean coolant means healthier working conditions.
- ✔ Wide application in the metal working field.

FOR UNIT OR BATTERY OPERATION

And for removal of ferrous and non-ferrous materials . . .
the
BARNESDRIL KLEENALL COMBINATION ***MAGNETIC AND FABRIC FILTERS***



Models from 5 to 103 gallons per minute capacity

Patent nos. 603083 and 731655, others pending. Any infringement will be prosecuted.

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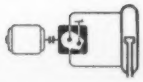
GASTON E. MARBAIX LTD
DEVONSHIRE HOUSE, VICARAGE CRESCENT, BATTERSEA, LONDON, S.W.11
PHONE BATTERSEA 8088 (6 lines)

High-pressure pumps

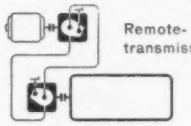


HYDRO TITAN

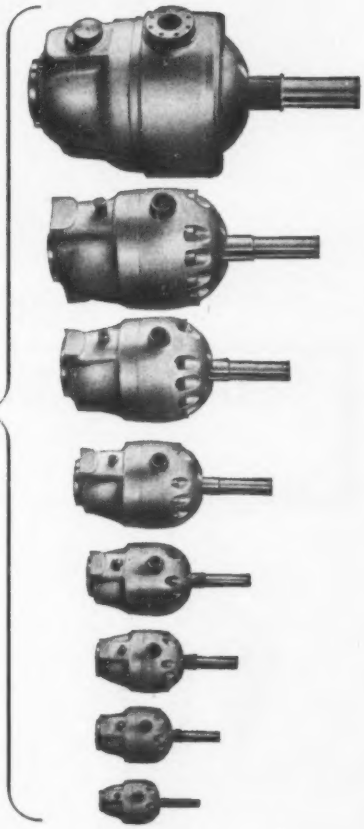
Infinitely variable control with

Hydraulic
transmission gears
and high-pressure pumps
from 2 HP
to several hundred HP

Standard
transmission gears



Remote-
transmission gears



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Variable over a wide range

Regulation with
constant torque power characteristics
or with constant horsepower output

High efficiency over a wide range

Continuous power transmission

Rapid, joltless reversing

Controlled braking

Large overload capacity

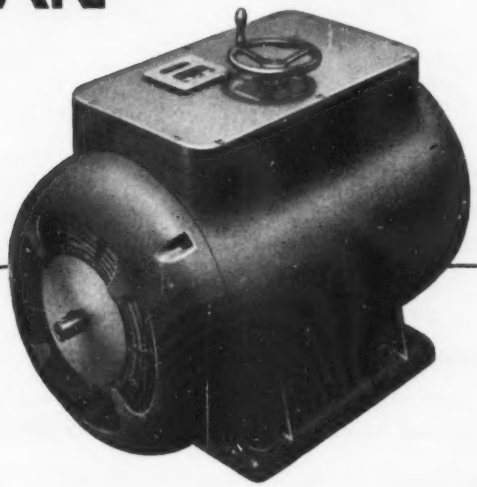
Simple maintenance

Flexibility of application

Parallel or series arrangement
of several fluid motors

HYDRO TITAN

the economical, proved and reliable
transmission gear
for all branches of industry and transport



DE ROLL

243

Louis de Roll Iron Works Ltd.
Works at Klus, Klus (Switzerland)

Sole agents for United Kingdom:
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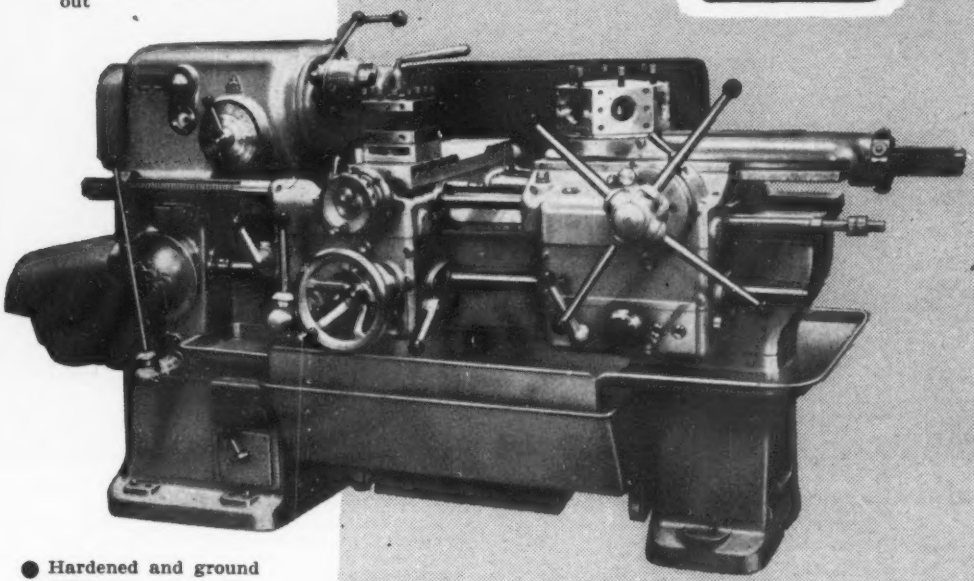
NEW

HEAVY DUTY Capstan Lathe

MODEL R5

- 2" bar capacity
- Pre-selection of 18 spindle speeds
- Pre-selection of 12 longitudinal and cross slide feeds
- Feed control by single lever
- Automatic feed knock-out

TOS



- Hardened and ground gears
- Screw-cutting attachment by leadscrew and nut

IMMEDIATE DELIVERY

EXCLUSIVE DISTRIBUTORS IN THE UNITED KINGDOM

SPECIFICATION

Max. bar sizes	2" dia.
Max. turning dia. over bed	20"
over cross slide	10"
Max. distance, spindle nose to turret	29½"
Spindle speeds (18)	28 - 1400 r.p.m.

ELGAR MACHINE TOOL COMPANY LIMITED

RIGHT OPPOSITE NORTH ACTON STN.

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NRP

35" of 1" square mild steel bar reduced to nothing in 35 hours

with one standard-cut SURFORM blade!

THAT'S THE RESULT OF ONE OF OUR RECENT TESTS using a normal standard-cut SURFORM blade. Under controlled conditions of stroke length and load, the same blade was used throughout the test—which proves that SURFORM is tough as well as fast!

This is not the only test SURFORM has passed with flying colours. The Sheffield Testing Works Limited put it through its paces not so long ago and their test proved that there's no hand tool faster than a SURFORM for reducing wood, copper and aluminium—as well as mild steel. And that means big savings in production and labour costs. We'd be glad to give you details.

500 TEETH—NO CLOGGING

The SURFORM blade is unique. It consists of a 10" strip of hardened and tempered Sheffield tool steel with 500 teeth set at a scientifically gauged angle. The depth of cut is controlled and clogging is impossible. The blade was invented by Firth Brown Tools Limited.

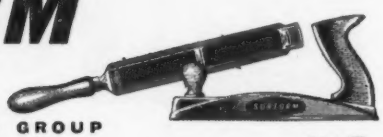
NOW IT COMES IN 6 DIFFERENT SURFORMS

Standard File 12/6; Standard Plane 17/6; Block Plane 10/- Fine-Cut File 12/6; Convex Plane 17/6; Half-Round File 13/-. Interchangeable replacement blades for all models.

HOW ABOUT A DEMONSTRATION?

We can easily arrange for a SURFORM demonstration on your premises. Drop us a line and we'll put our area representative in touch with you.

SURFORM



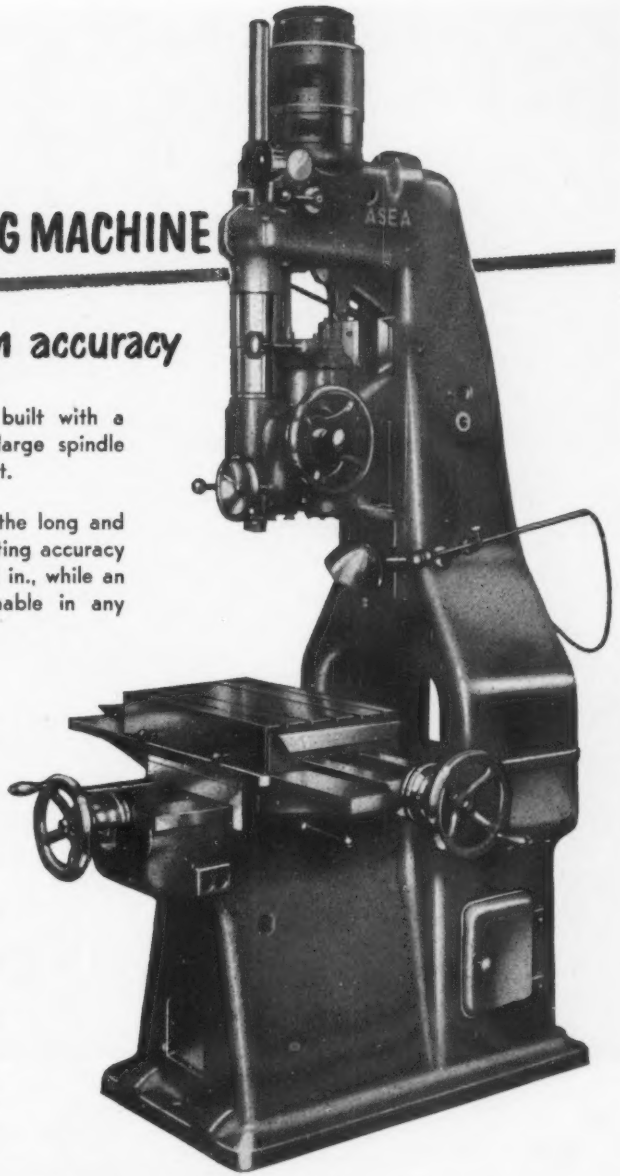
Made by: SIMMONDS AEROCESSORIES LTD.
TREFOREST • PONTYPRIDD • GLAMORGAN

A MEMBER OF THE FIRTH CLEVELAND GROUP

CRC 345U

ASEA JIG BORING MACHINE

for toolroom accuracy



This high-class machine is rigidly built with a large table, ample throat space, large spindle and spindle head vertical movement.

The micrometer screws controlling the long and cross travel of the table allow a setting accuracy of ±0·0002 in. over a length of 12 in., while an accuracy of ±0·0001 in. is attainable in any one inch of the screws.

SPECIFICATION

High speed spindle ranges	215-460-940-2050 r/m
Feed per spindle revolution	0·0012"-0·0035"-0·0059" (0·03-0·09-0·15 mm)
Spindle head vertical movement	7½" (190 mm)
Spindle vertical movement	6⅞" (175 mm)
Table dimensions	15" x 22" (380 x 560 mm)
Distance spindle to table	19 11/16" (500 mm)
Screw accuracy: over 12" of length	±0·0002"
over 1" anywhere	±0·0001"
Weight	2900 lb. (1300 kg)

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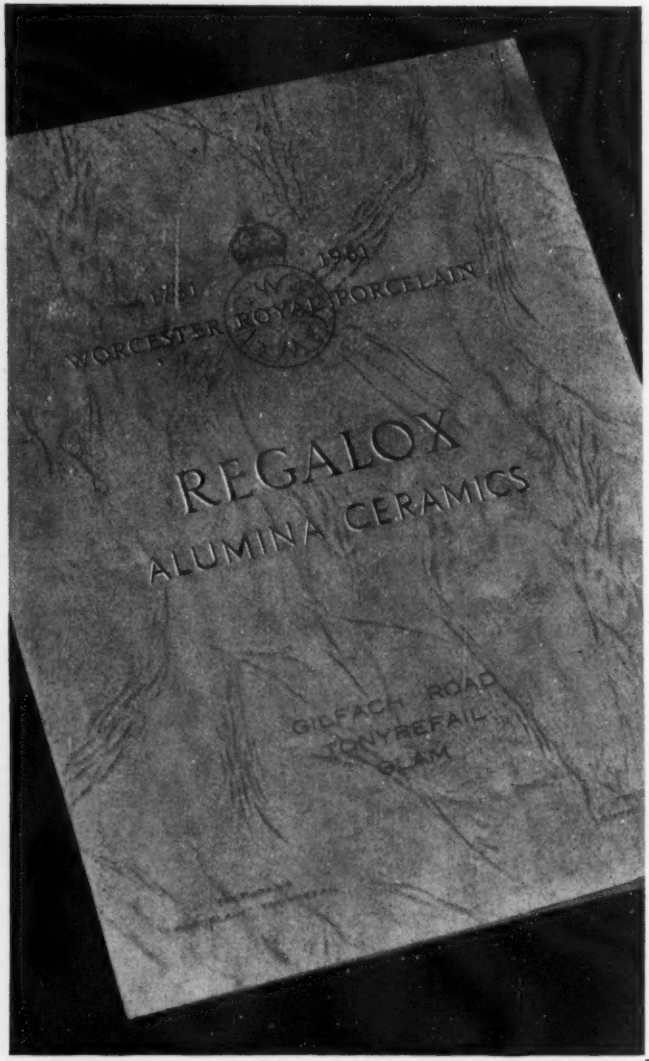
PROPRIETORS **COMPANY** S. GUITERMAN & CO. Ltd

Showroom & Sales: **204/206 ACTON LANE · HARLESDEN · N.W10** · Tel: **ELGAR 3834**



New techniques present new problems

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With a hardness between diamond and sapphire, highly resistant to wear and possessing excellent physical properties, REGALOX hard ceramics have been the solution to many difficult problems in the engineering industry—chemical—mechanical—electrical.

OUTSTANDING ADVANTAGES

- WEAR & HEAT RESISTANT
- DIMENSIONALLY STABLE UNDER ALL CONDITIONS
- LOW CO-EFFICIENT OF FRICTION
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Our Technical Development Advisory Service is immediately available to tell you where REGALOX can be applied with advantage to your own products.

Already in use for jig bushes, plug gauges, tool tips, wire guides, textile guides, grinding balls, etc.

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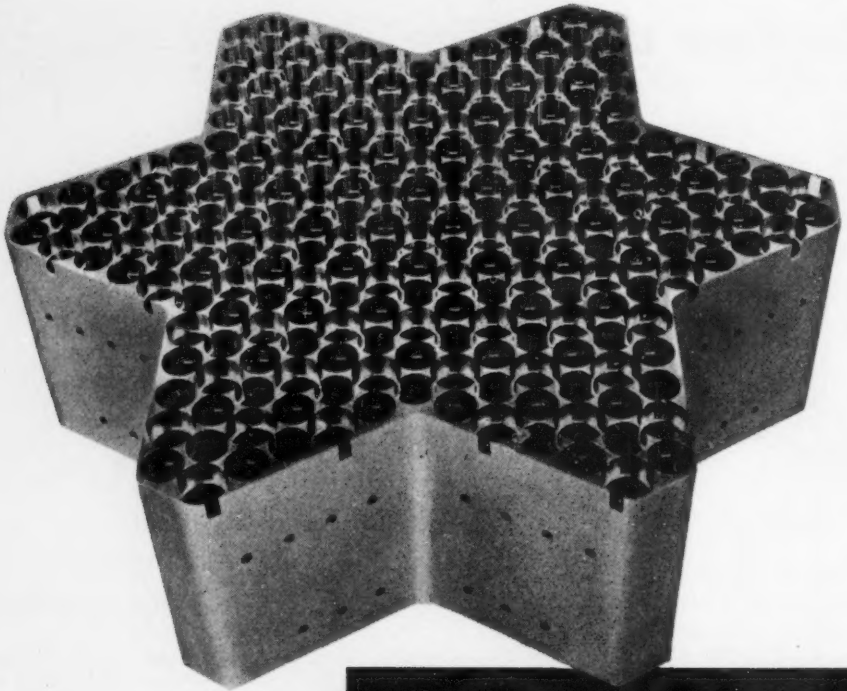
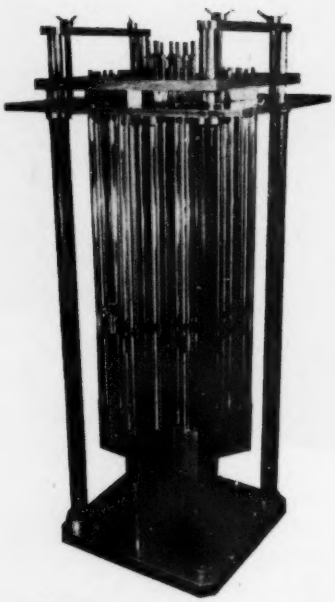




AT THE HEART OF PRECISION ENGINEERING

SILCOMS

Limits of accuracy were set at ± .005" on the overall dimensions of the Core Tube Nest for the Dounreay Fast Reactor—so they asked SILCOMS to build it. This most intricate assembly was fabricated entirely from stainless steel and SILCOMS had to design and build special equipment in order to overcome the difficulties involved in machining and assembling. The bottom core plate (shown above) illustrates the skill called for; it was machined from a 6" thick forging in which some 270 holes had to be bored.

We are particularly happy in devising and building special purpose machinery of the highest standards of accuracy — we have the resources, the men and above all the enterprise and the enthusiasm for a good job well done.

What can we do for you?

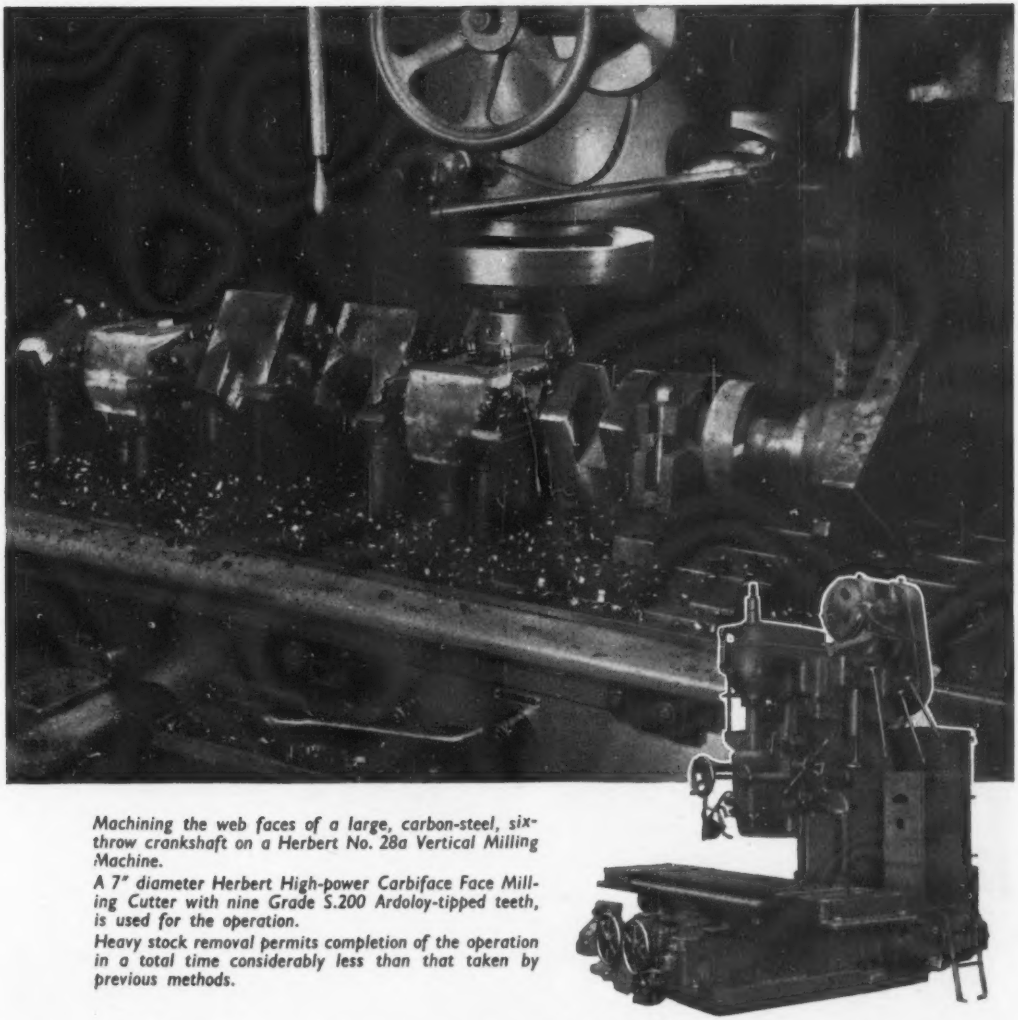
MANUFACTURERS OF SPECIAL PURPOSE EQUIPMENT

PRESS TOOLS · FIXTURES · JIGS

MOULDS FOR PLASTICS, GLASS, RUBBER, ETC.

SILCOMS (Proprietors: Bolton Engineering Co. Ltd.) VICTORIA WORKS · FARNWORTH · LANCASHIRE
Tel.: FARNWORTH 1305-6. AND AT 327 BURY ROAD : BOLTON : LANCASHIRE : Tel.: BOLTON 3545

5.4



Machining the web faces of a large, carbon-steel, six-throw crankshaft on a Herbert No. 28a Vertical Milling Machine.

A 7" diameter Herbert High-power Carbiface Face Milling Cutter with nine Grade S.200 Ardoloy-tipped teeth, is used for the operation.

Heavy stock removal permits completion of the operation in a total time considerably less than that taken by previous methods.

HERBERT Vertical Milling Machines

No. 47V. Has the power, speeds and rigidity for milling materials from aluminium to high-tensile steels. Thirty-two speeds, 21 to 1,525 r.p.m.; twenty-four feeds ¾" to 60" per min.; quick traverse to longitudinal motion. 48" × 16" × 23".

No. 49V. For heavy work requiring large table capacity. Thirty-two speeds, 21 to 1,525 r.p.m.; electronic feed drive, infinitely variable feeds from 0.8" to 40" per min.; quick-traverse to longitudinal and transverse motions. 62" × 29" × 28½".

No. 28A. For heaviest class of work. Thirty-two speeds, 12 to 540 r.p.m.; electronic feed drive, infinitely variable feeds between 0.8" and 40" per min.; quick traverse to longitudinal and transverse motions. 62" × 29" × 30½".

All models now available for Early Delivery

ALFRED HERBERT LTD., COVENTRY

AD.277


63
62
0 10 20 30 40 50 60
2' 50 40 30 20 10 1' 50
when one second
is vital . . .
Whether for inspection purposes or highly accurate positioning
of workpieces featuring compound angles, only the new
O.M.T. 12" and 16" Optical Rotary and Inclinable Tables provide
scale readings direct to one second of arc for both movements.
Combining accuracy with reliability, each model is fitted
with a twin eyepiece unit to facilitate reading of the rotary
at any position throughout the axis of inclination.
Magnified view
through eyepiece showing
scale reading 62° 1' 48"
A PRECISION PRODUCT OF
OPTICAL MEASURING TOOLS LTD
MAIDENHEAD BERKS
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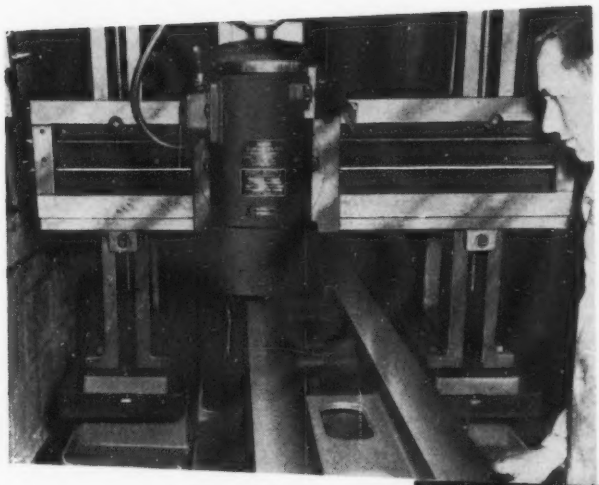
full details on request to
NEWALL GROUP SALES LIMITED
PETERBOROUGH ENGLAND

WRIGHT

Self-contained—Motorised Grinding Heads

(COVERED BY BRITISH AND FOREIGN PATENTS)

An ideal supplementary attachment to
PLANING, MILLING, BORING & TURNING MACHINES
and most types of heavy lathes



- ★ Available in Five Sizes
- ★ Independent Operation
- ★ Locking device for securing the "Depth-of-Cut position
- ★ Calibrated Scale Ring

Compensation for wheel wear and/or fine adjustment of depth of cut is obtained through traverse of the rotor by means of a hand-wheel

Illustration shows a Model 1.5/2P Motorised Grinding Head attached to a Fritz Werner Hydraulic Slide-way Grinding Machine. In this instance the surface of a Ward No. 7 Capstan Lathe bed is being re-ground.

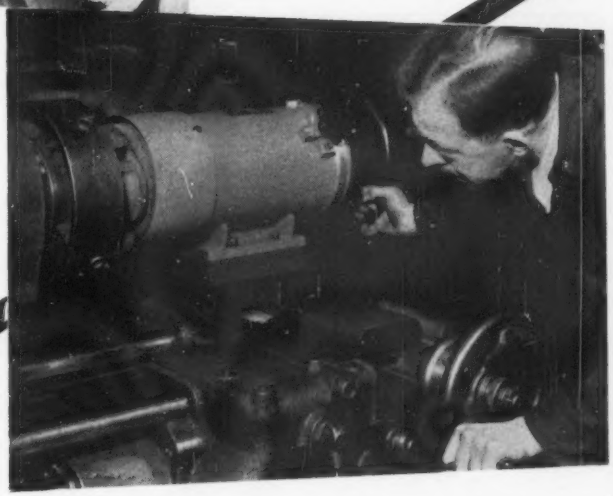
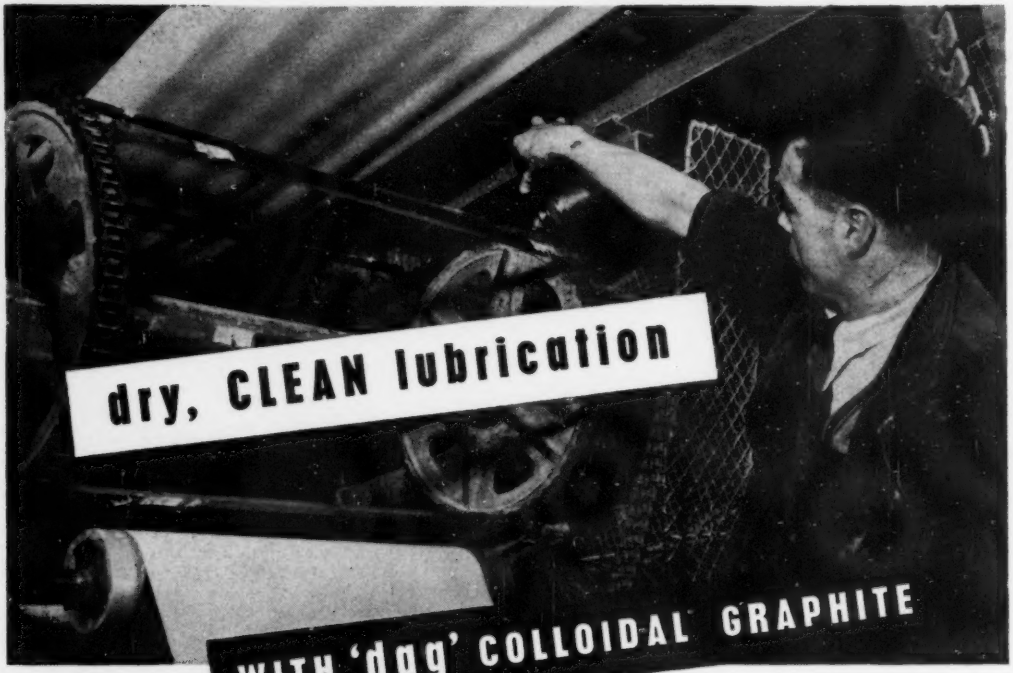


Illustration shows Model 1.5/2P Grinding Head attached to a Ward No. 7 Lathe, a hardened steel distance piece being ground in this instance.

WRIGHT ELECTRIC MOTORS (HALIFAX) LTD
CENTURY WORKS · PELLON LANE · HALIFAX · ENGLAND
MANUFACTURING ELECTRICAL & MECHANICAL ENGINEERS
ESTABLISHED 1900
Phone 60201-2-3 Cable: "Motor" HALIFAX


F. B. T.
FATH BROWN TOOLS LTD
SPEEDICUT WORKS, CARLISLE STREET EAST,
SHEFFIELD ENGLAND



When wallpapers are printed, cleanliness is all-important. Oils and greases that splash, drip, or run, are out of the question. At the works of The Wallpaper Manufacturers Ltd., Leeds (a member of the Crown Group) conventional oils and greases cannot be used on the fast-moving conveyor chains of the drying unit, which operates at a temperature of 220° Centigrade. After testing all possible lubricants, Crown adopted an Acheson dry-film lubricant, 'dag'* Dispersion 2404 (colloidal graphite in white spirit), and this product has been standard at the Leeds works for many years. For effective, economical and long-lasting lubrication of conveyors, chains, and other equipment working to "no-soilage" rule, Acheson dry-film technique is the answer. If you feel that 'dag' dispersions could help to solve problems for you, we shall be pleased to send a Field Engineer to carry out a lubricant survey without obligation on your part.
Conveyors and chains are dealt with in our Information Sheets P1 and P2. We shall be pleased to send copies.

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dag REGD TRADE MARK **dispersions speed production**

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The fastest method of grinding two surfaces simultaneously!

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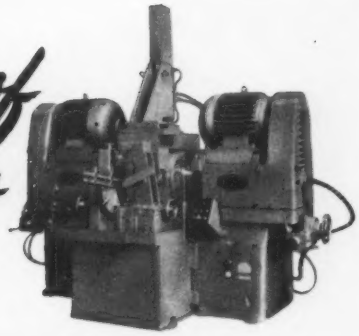
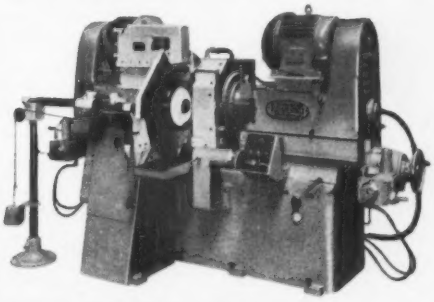
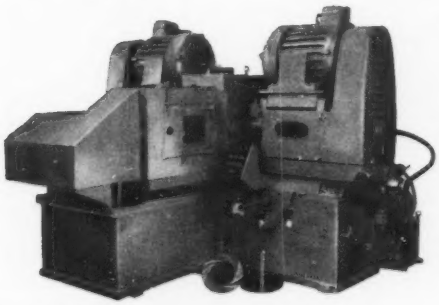


CIRCLIPS 30in. Type ADD/P

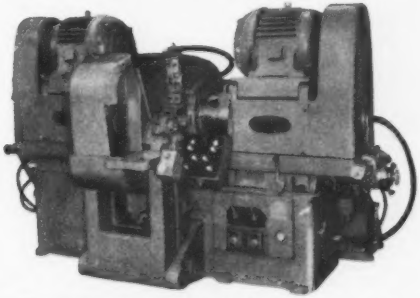


CALCULATOR PARTS 20in. Type HDD/C

✳ Illustrated here are but a few of the very many types of 'Duplex' surface grinding machines that we manufacture.



BRAKE DISCS 30in. Type ADD/H



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Our technical representatives are ready, able and willing to co-operate with you.

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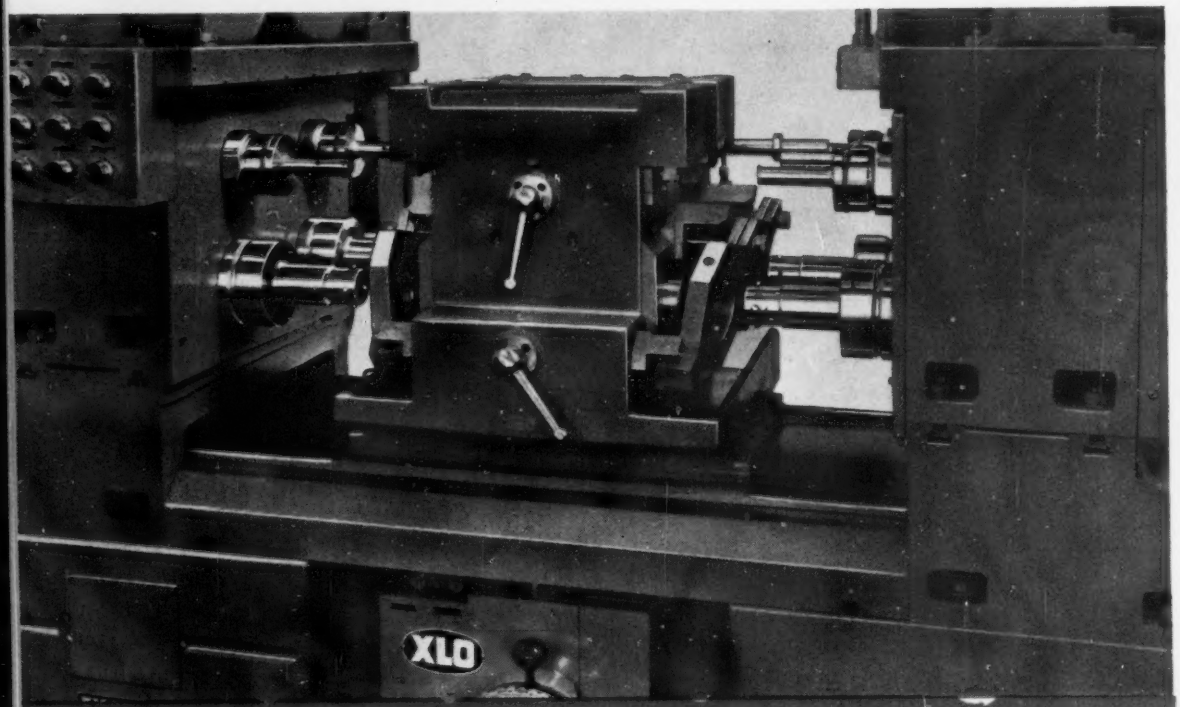
* BORING CONNECTING RODS . . .



*220 per hour!

This is a typical EX-CELL-O set-up in a well-known automobile factory, where EX-CELL-O machines have proved their ability to reduce costs and improve finish on a wide variety of work. Both the large and small ends of the rods are machined and the production rate is 220 pieces per hour. We invite you to investigate the cost reducing possibilities of EX-CELL-O machines for your own work. No obligation.

EX-CELL-O

STYLE 112C SENIOR PRECISION BORING MACHINE

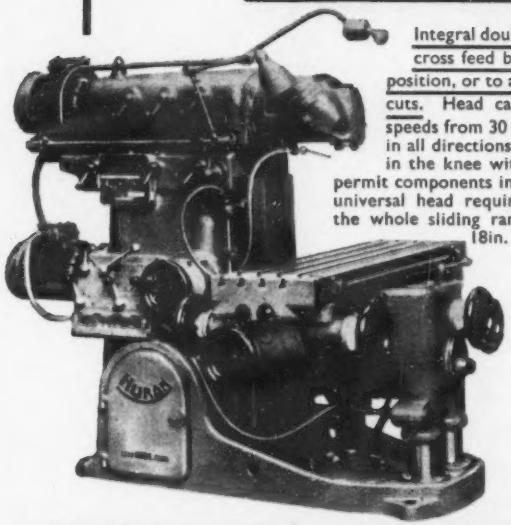
EX-CELL-O CORPORATION (MACHINE TOOLS) LIMITED
HASTINGS RD., LEICESTER, ENG. TEL.: LEICESTER 68181 (10 lines)

HEAVY DUTY MILLING

ANGULAR COMPOUND HORIZONTAL VERTICAL

HURON SUPER UNIVERSAL MILLERS

SLIDING RAM GIVES 27½in. AUTO CROSS FEED



Integral double swivelling universal head provided with 27½in. automatic cross feed by the sliding ram, can be set to the horizontal or vertical position, or to any angle instantaneously—permits the heaviest production cuts. Head can be retracted completely from table line. 27 spindle speeds from 30 to 2,066 r.p.m. 27 feeds from $\frac{1}{12}$in. to 30in. Rapid traverses in all directions. All operating controls duplicated. Table slides directly in the knee without cross movement or swivel. Double guides of knee permit components in excess of 1½ tons to be machined. The double swivelling universal head requires an opening of only 14in. to enter work pieces and the whole sliding ram with its 27½in. automatic cross movement needs only 18in. clearance.

Type	Table	Automatic Feeds Long	Cross	Vert.
KU4	56$\frac{7}{16}$in. × 15¾in.	43½in.	27½in.	19¾in.
KU5	64$\frac{7}{16}$in. × 15¾in.	51½in.	27½in.	19¾in.
KU6	78⅜in. × 16½in.	59in.	27½in.	19¾in.
L7	157in. × 39in.	118in.	27½in.	39¾in.

Type 'L' Open-side Traversing Head Universal Miller will mill, bore, slot and drill the largest work-pieces at one setting.
The unique design permits greatest variety of operation on large work-pieces; the component remains stationary on the large work-table. Upright slides full length of base table, and the sliding ram moves vertically and horizontally.

DUFOUR UNIVERSAL MILLERS

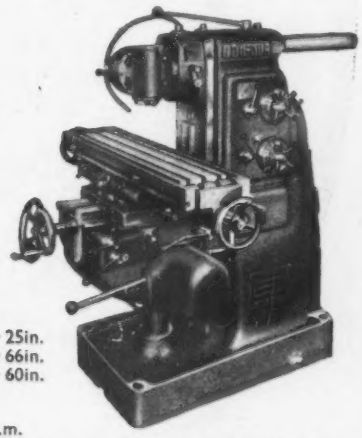
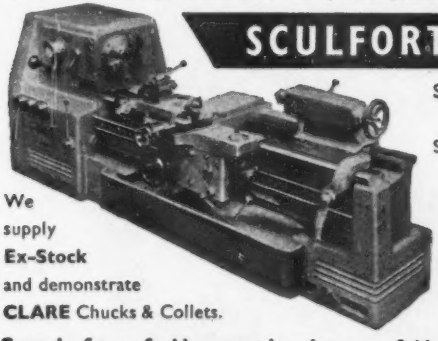


Table surface 43$\frac{5}{16}$in. by 9$\frac{7}{16}$in. or 47¼in. by 10$\frac{7}{16}$in. Auto long. feed, 26½in. or 30½in. Auto vert. feed, 15¾in. or 18⅞in. Auto cross feed 9½. Rapid traverse in all directions. No. 40 International taper for main spindle, universal head, and rotary table. Direct reading dial change for speeds and feeds. All parts subject to wear hardened and ground and completely interchangeable. Built to closest tolerances. Spindle speeds 21 to 1,600 r.p.m. Twin overarms. Separate motor for rapid traverses.

Also table 63in. by 15in., with auto feeds: 40in. long., 21in. vert., 14in. cross; 25in. auto-univ. head feed. 36 spindle speeds 6 to 1,500 r.p.m.

SCULFORT LATHES



We supply **Ex-Stock** and demonstrate **CLARE** Chucks & Collets.

Swing over bed 20, 22 or 25in.
and 28, 32 or 66in.
and 40, 47 or 60in.
Speed ranges: 6-2,000;
12-1,600;
or 3½-325 r.p.m.

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It occurs to us it would be a good thing for you to find out more about our F.B.1 Fine Boring Machine and equipment.

Table travel, 15in. Height centre of spindle to table, 10in.
Table surface Pad, 26in. by 8½in. Table feeds, ¼in. to 60in. per minute.

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FOR *PACE* · POWER · PRECISION

Model R.16 for Instrument Gears.

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Pfauter Type No.	Max. Gear Dia. ins.	Max. Gear width ins.	Max. D P
R 16	3⅛	2	25
RS 00	10	6½	10
P 250	10	6½	7
DRA duplex	10	10	3
P 400	15¾	11¾	4½
P 500	20	14	3
RS 1V	29½	12½	3
P 900	35½	15	3·2
RS 2V	39½	14½	2½
P 1250	49½	19¾	2·1
RS 3V	71	21	2½
P 1800	71	24¾	1¾
P 2500	100	24¾	1¾

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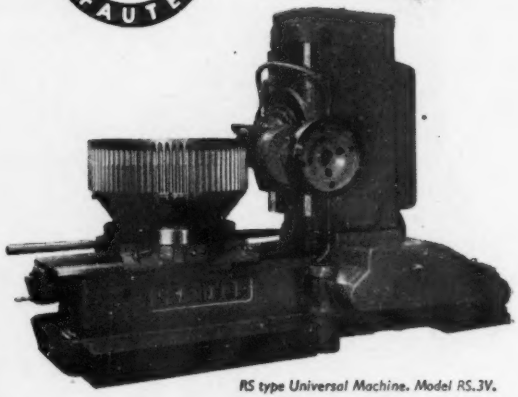
P 160	7	13½	6
RS 9K	11½	27	2½

Worm and Thread Milling Machines

SF 1	11½	27	1¾ CP



RS type Universal Machine. Model RS.3V.

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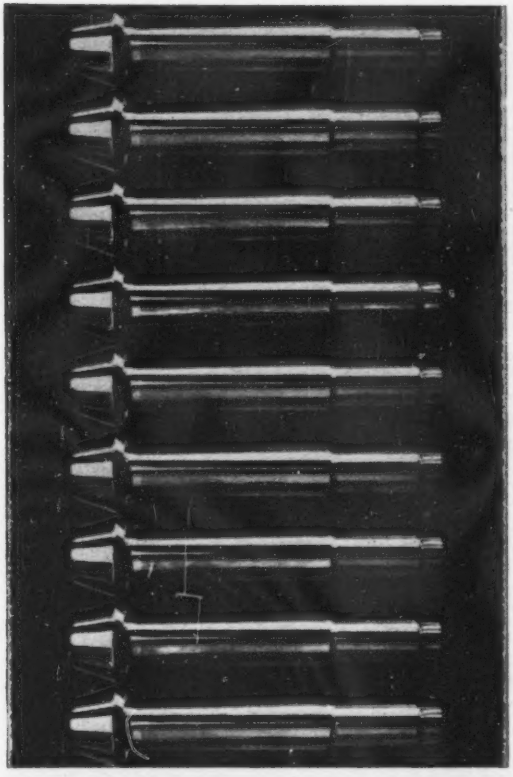

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Setting up and changeover remains quick and easy.

The programme may be cut into at any time.

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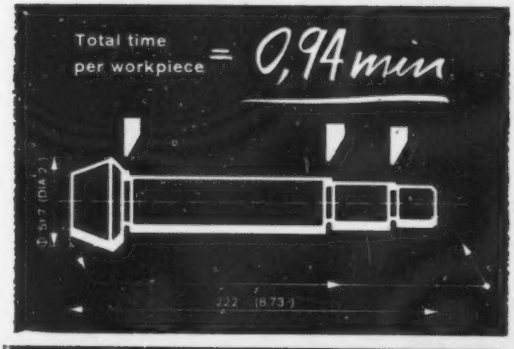

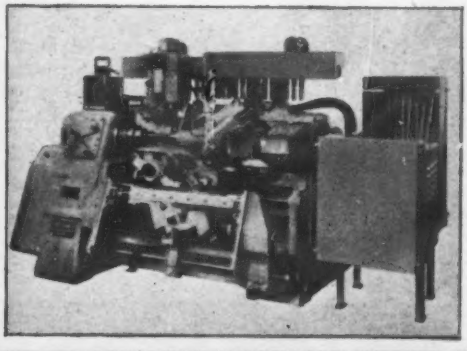

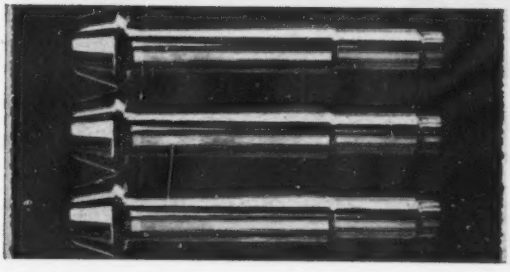

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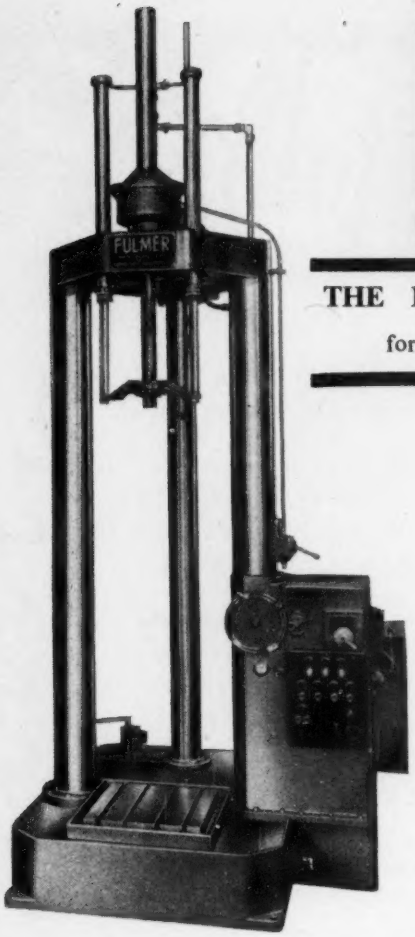

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for fast precision finishing of internal cylinders.

The Purfection Engineering Co. (Coleshill) Ltd., of Coleshill, near Birmingham, the United Kingdom makers exclusively recommend EVCO MEDIUM HYDRAULIC OIL for use in the NEW FULMER HONING MACHINE.

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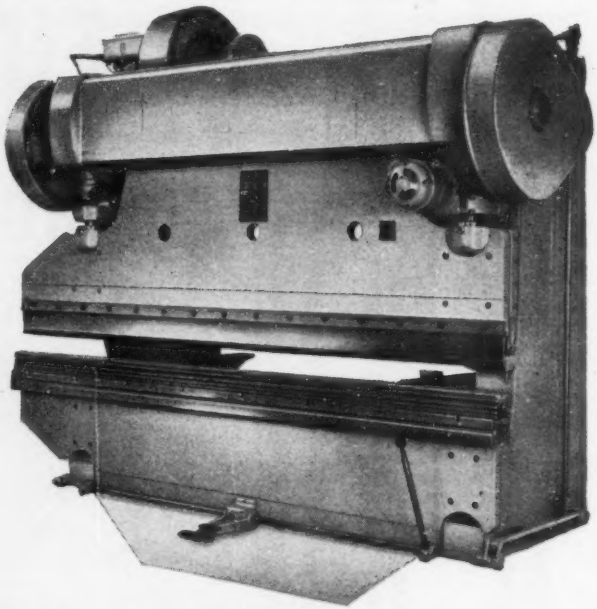
Working length	12ft. 3½in.	13ft. 11½in.
Between housings	102½in.	140in.
Throat	12in.	12in.
Weight (approx.)	20 tons	25 tons



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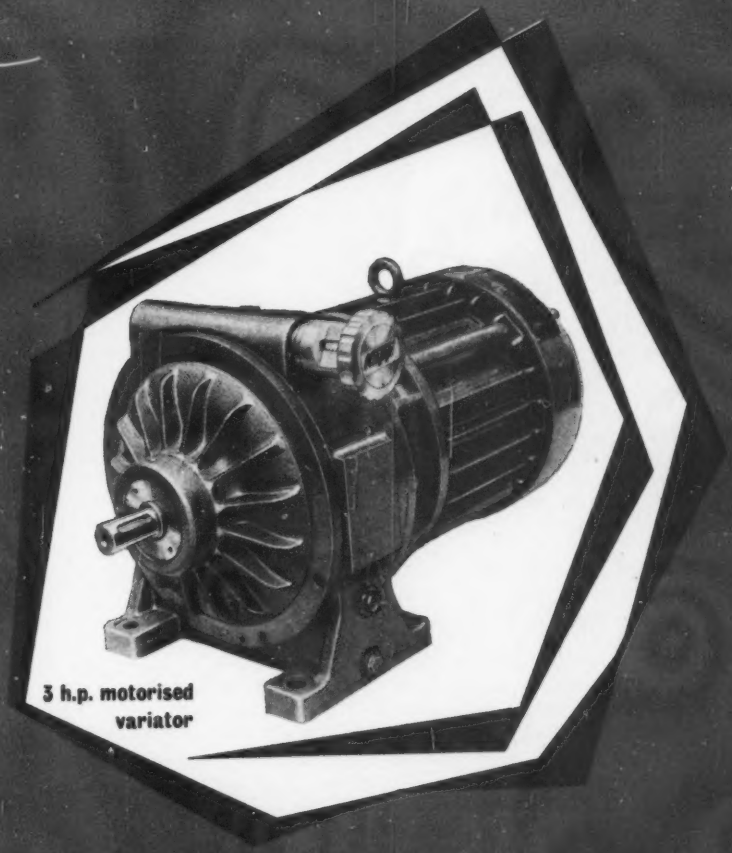

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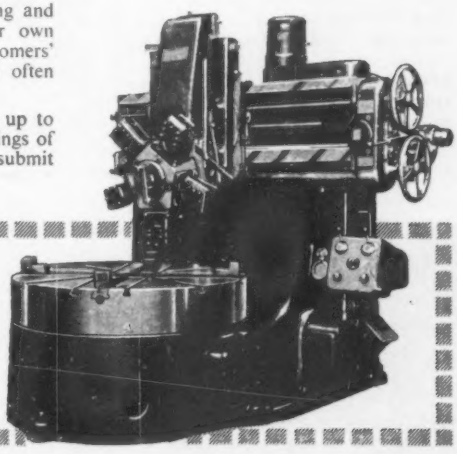
If you have to machine castings and forgings up to 80" swing, perhaps we can help *you*. Send us drawings of your components; our technicians will be glad to submit production proposals.



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I know from your hundreds of letters (said the Managing Director) how you have *longed* to own a Desoutter Electric Tool. Now you can go to your usual Tool Merchant or Ironmonger and buy one. It is as easy as that! This does not mean we are discontinuing our 30-year old policy of supplying customers direct nor that we are going into the 'home handicrafts' business with a cheap tool. If your usual supplier by some extraordinary oversight is not stocking Desoutter Tools, write at once to any of our main distributors (the first three are shown below) or direct to me at Hendon and you'll be supplied even if it means I have to bring the blessed thing along personally! My one aim and intention is to serve you!

(*"At a certain profit" muttered a rather cynical customer*)

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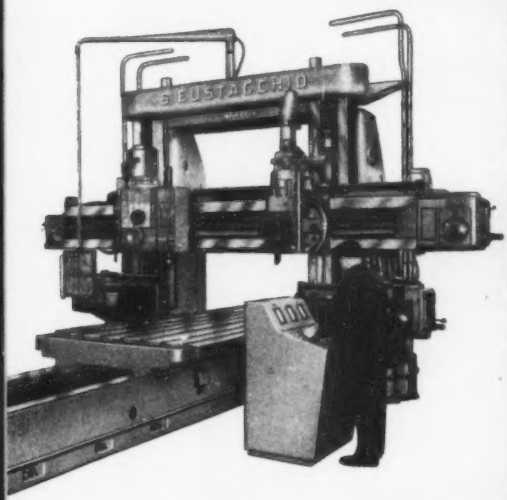

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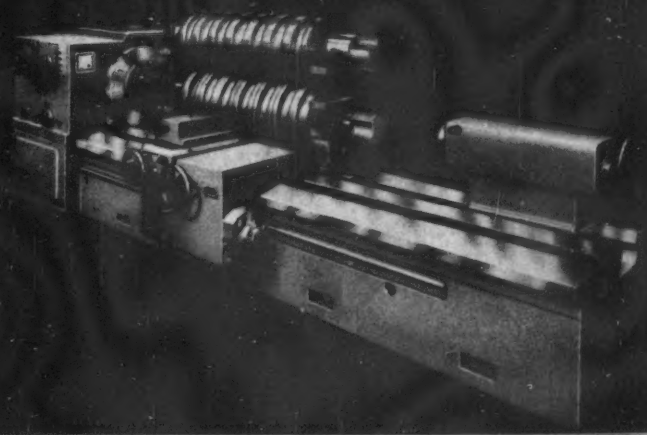

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Abstracts of Principal Articles

Aspects of Russian Engineering Industry P. 1272

In this article, which concludes the series on Russian engineering plants and other establishments, reference is made to two closely associated works in Leningrad. The Metallic plant is the largest in the U.S.S.R. for the construction of steam and water turbines. Of particular interest are the facilities that have been provided for the machining of large water turbine components, in order to meet the demands of the latest electrical power programmes for the Volga and Siberian rivers. The equipment includes a large duplex copy-milling machine for semi-finishing the surfaces of propeller blades; a grinding machine for finishing the blade surfaces; a special horizontal turning and facing machine for operations on the blade flanges; and a double-end horizontal turning machine for guide vanes. Electrical equipment for the steam and water turbines is supplied by the Electrosila plant, which is claimed to be the largest for this type of equipment in Europe. There are separate shops of large area for the building of generators of each type, and some very large machine tools are installed. Welding is widely employed for the construction of large generator components. (MACHINERY, 93—3/12/58.)

Electronically-controlled Press Feed for Transformer Lamination Strip .....P. 1287

Subsequent to an earlier article in MACHINERY on the flow-line methods employed by Ferranti, Ltd., for the manufacture of distribution transformers, details are here given of the production of laminations for the lock-wound cores. The laminations are produced from 0·014-in. thick coiled material on a 40-ton Hordern, Mason & Edwards type L40 press to which the company have fitted a motorized coil cradle and a fully-automatic electronically-controlled feed unit, whereby laminations of any length required can be cut to an accuracy of 1/64 in. The required length of feed is pre-set on a Londex electronic unit which has four knobs that represent units, and units × 10, × 100, and × 1,000. There are four dekatron counters operating in conjunction with a photo-electric cell and a large-diameter slotted disc, which is driven from the lower feed roll shaft. When the required length has been advanced, the feed is automatically stopped and the press clutch is engaged. During the press stroke, a cam on the crankshaft resets the feed unit. (MACHINERY, 93—3/12/58.)

Operations on Ford Rear Axle Differential Spiders .....P. 1289

Differential spiders employed in Ford commercial vehicles are machined from alloy steel forgings of cruciform shape. At the first major operation, the four arms are roughed on a special hollow-turning machine. After two of the arms have been turned, the component is automatically indexed, to bring the other arms into position. Rough grinding follows, and the arms are then induction surface hardened on general purpose equipment which provides for the treatment of 18 different components. (MACHINERY, 93—3/12/58.)

Machining Operations on Honeycomb Structures .....P. 1295

An account is here given of a series of experiments which have been carried out by General Electric Co., U.S.A., on various methods of machining honeycomb structures. Of nine different types of milling cutters which were specially designed, only two were wholly successful, and both of these were of the knife-edged disc type. Both could be operated at surface speeds between 2,400 and 3,200 ft. per min., at feed rates as high as 30 in. per min. The use of various types of filler material is discussed, including sodium silicate mixed with either iron powder or stainless steel powder. Holes can be produced in honeycomb structures by the electrolytically-assisted grinding process, using a special solution of non-corrosive electrolytic salts in place of the standard coolant. For sawing the structures, a DoAll bandsaw was used which had a maximum speed of 10,800 ft. per min. Various types of blades were employed, including the conventional toothed type, but single- and double-bevel knife edge blades proved most satisfactory from the standpoint of cleanness of cut. (MACHINERY, 93—3/12/58.)

Set-up on a Conomatic for Producing Wedge Gate Valve Seats.....P. 1310

A specially-equipped British-built Conomatic 1⅝-in.-6 machine is employed for machining wedge gate valve seats from stainless steel bar in a cycle time of 38 sec. The valve seat has a 5-deg. angular front face, which is machined by means of a special angular facing attachment mounted on the end-working slide. The tool-holder is prevented from rotating, and the required pivoting movement is imparted by a co-axial spindle driven in synchronism with the work spindles. A zero mark, coincident with the low point of the 5-deg. taper, is scribed at the sixth position by a rotating attachment on the end working slide. (MACHINERY, 93—3/12/58.)

Contributions to MACHINERY

If you know of a more efficient way of designing a tool, gauge, fixture, or mechanism, machining or forming a metal component, heat treating, plating or enamelling, handling parts or material, building up an assembly, utilizing supplies, or laying out or organizing a department or a factory, send it to the Editor. Short comments upon published articles and letters on subjects concerning the metal-working industries are particularly welcome. Payment will be made for exclusive contributions.

Russia—A Challenge

In this issue of MACHINERY is published the concluding article in the series on the Russian engineering industry, which was prepared by a member of our editorial staff who visited Moscow and Leningrad earlier this year. An attempt has been made in this series to give a factual account of some typical factories in what are still two of the most important industrial centres of the Soviet Union. The plants described have covered a wide range of products, which have included machine tools, cutting tools, motor vehicles, ball and roller bearings, steam and water turbines, heavy electrical equipment, and steel strip and wire. These articles have been published solely because we believe that British engineers should be kept informed of Soviet industrial progress.

During the past 10 to 15 years, some remarkable advances have been made in Russian industry, and the rate of advance is being maintained, if not accelerated. The results achieved have been due partly to careful overall planning, but even more, perhaps, to the very extensive research facilities that are available to industry, and to the ample supply of trained scientists, technologists and engineers provided by Russian educational establishments. Two research institutes have been discussed in this series, one of which has a total staff of 4,000, the other, more than 2,000. These figures include the employees in the workshops for building experimental machines and equipment, but technicians, designers, and higher-grade research workers form the major proportion of the staff of each institute. It should be pointed out, moreover, that these institutes are only two among many similar centres for industrial research in various parts of Russia.

From information obtained during the visit it would appear that the Russian educational system is inclining increasingly towards the sciences and technologies. Every encouragement is given to industrial employees of all grades to improve their standards of education, for example, each qualification that is gained entitles the holder to a specific increase in salary. Almost all factories have provisions for technical training, and these facilities form part of a planned system of scientific and technological education for the whole of Russia. As an indication of the trend of Russian education, attention may be drawn to the arrangements for higher education in Moscow. Here, the old university, near the centre of the city, accommodates about 1,000 students of the humanities, whereas some 24,000 students of the exact sciences occupy the new university in open surroundings on Lenin Hills. Again, it should be noted, this new university is only one of many establishments for higher scientific training in the Soviet Union.

In contrast to what is being done in most Western countries, large numbers of women are studying engineering and allied subjects in Russia. In the majority of the factories visited during the preparation of these articles, women formed more than 50 per cent of the technical staffs, and it may be noted that women were in charge of several of the technical departments. At one of the largest machine tool plants in Moscow, moreover, a woman had the post of deputy director, and engineering is generally held to be a suitable and worth-while career for women in Russia. Indeed, the engineering industries enjoy a very high status, which may account for the enthusiasm that was evident among all grades of workers, whether men or women. This enthusiasm is further stimulated by propaganda associated with the drive to beat the industrial output of the West, which is assuming the nature of a "crusade."

In spite of the efforts that have been made during the past 15 years, in connection with the building of new plants, research into new materials, equipment and techniques, and the provision of increasing numbers of scientists and technologists, Russia is still faced with formidable tasks in the development of her natural resources, the further expansion of her industries, and the provision of the consumer goods that are necessary for the improvement of the living standards of the people. Nevertheless, she is already directing her attention towards export markets for her engineering products, particularly in some undeveloped countries. In this connection, it may be of interest to note that one of the largest machine tool works in Moscow exports about 40 per cent of its output, mainly to countries of the communist *bloc*, but also to India, Egypt and the Middle East. Once her own needs have become less pressing there can be little doubt that Russian efforts in the export field will be substantially increased. As a result of planning and rationalization of industry, it has been possible to provide high-output plants for the

(*Continued on page* 1322)

Aspects of Russian Engineering Industry

Some Impressions Based on a First-hand Study of Soviet Plants

Earlier articles in this series* have been concerned with the growth of the Russian machine tool industry; the design of some modern Soviet standard and special machines; automatic transfer machining lines; representative Russian machine tool and cutting tool works; two of the large industrial research establishments that serve Soviet industry; a large works for the manufacture of ball and roller bearings, which incorporates an automatic plant for the production of two types of bearings; a large factory building commercial vehicles and bicycles; and a works for the rolling and drawing of steel wire and strip. In this article —which concludes the series—two important manufacturing plants in Leningrad will be considered, namely, the Metallic Turbine Works and the Electrosila Electrical Plant.

THE METALLIC TURBINE WORKS

The Metallic plant is claimed to be the oldest in Leningrad, and the centenary of its foundation was celebrated in 1957. Even before the revolution, the plant was engaged in the building of steam turbines, which were of foreign design, for driving generators of 200 kW. output. The plant has been greatly expanded since the revolution, and it is still the largest in the Soviet Union engaged in turbine work, with separate sections for building steam and water turbines. Considerable assistance in connection with the expansion of the plant was received from the Metropolitan-Vickers Electrical Co., Ltd., and this company is held in high esteem by the senior engineers of the Metallic works.

Some 11,000 people are employed at the plant, of whom 2,000 to 2,500 are technical staff, and, as in other Soviet plants, there are well-organized training facilities and welfare services. Forty per cent of the technical staff, and 15 to 20 per cent of the factory workers, are women. We were informed that the time required to build a new steam turbine is two years from receipt of order, including the period required for research and development. The actual time required in the production shops was stated to be six to eight months, and it was indicated that the latter period suffices for executing a repeat order. Each water turbine is designed to suit the requirements of the particular power station in which it is to be installed, and the building times for such turbines do not vary

* MACHINERY, 93/4-2/7/58; 93/137-16/7/58; 93/174-23/7/58; 93/288-6/8/58; 93/345-13/8/58; 93/456-27/8/58; 93/572-10/9/58; 93/864-15/10/58; and 93/1272-3/12/58.

appreciably from those quoted. The generating equipment for both steam and water turbines is supplied by the Electrosila works.

STEAM TURBINES

Before 1941, the turbines built by the Metallic plant were of the low-pressure type, and the largest was for a generating set of 100 MW. output. At that time, a development programme was in hand for the construction of a turbine for a 25-MW. generating set, with a maximum working pressure of 425 lb. per sq. in. All work associated with turbine production was abandoned during the second world war, and when work was resumed in 1944, it was decided to concentrate on the development of high-pressure machines.

The first large turbine of this type was completed in 1946, and had a maximum working pressure of 1,320 lb. per sq. in. This machine was built for a 100-MW. generator set, and for a considerable period the output of the Metallic plant consisted mainly of units of similar type. At the same time, development work was proceeding in connection with turbines of greater output, and, in 1951, work was started on a turbine to operate at a maximum pressure of 2,500 lb. per sq. in., for a 150-MW. generator. Several very large turbines have been built for Moscow and other power stations, and this year a high pressure turbine for a 200-MW. generator will be completed. All steam turbines built by the plant operate at 3,000 r.p.m., and preliminary development work has been initiated in connection with a turbine operating at 2,500 lb. per sq. in. for a 300-MW. generator set. We were informed that the plant has the necessary facilities for building a machine of this large size, and that it was hoped to have such a machine in operation within the next few years.

Turbines built by the Metallic plant operate with a steam inlet temperature of 565 deg. C. (1,049 deg. F.). Generally, a steel casting is employed for the high-pressure cylinder, but the low-pressure cylinder is of welded construction. Blades are made from a pearlitic stainless steel, which contains up to 13 per cent of chromium, and 0·15 to 0·20 per cent of carbon. The longest blade normally employed is 66 cm. (25·984 in.), but trials are now being carried out to determine the effectiveness and practicability of blades up to 76·5 cm. (30·118 in.) long.

WATER TURBINES

In comparison with the building of steam turbines, the design and construction of water turbines is a fairly recent development. At first only low-power units were built, but by 1941, the plant had

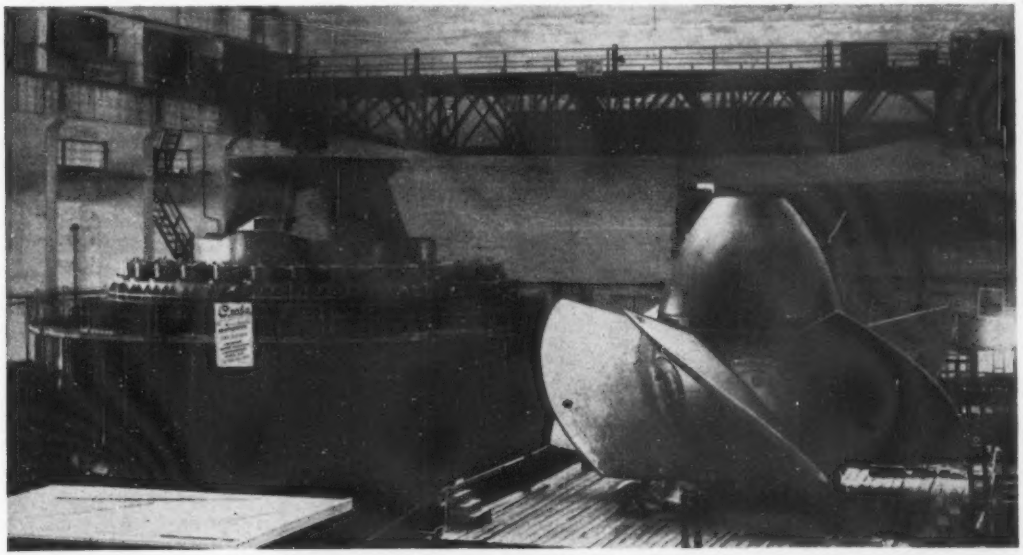


Fig. 1 The runner and casing for a large water turbine built by the Metallic plant, Leningrad, are here seen at one end of the main bay of the water turbine shop

constructed several water turbines with rotors of 30 ft. diameter for generators of 65 MW output, and it may be of interest to note that these units are still in operation. An extensive programme of development and research work relating to water turbines has been carried out, and since the last war many large units have been built. Among these turbines may be mentioned three replacement units for the large Dnepropetrovsk power station which was seriously damaged during the war. Originally, this station was equipped with nine American Francis turbines, and six of the new units were obtained from the U.S.A. The new Russian turbines are designed to operate at 83 r.p.m.

A large water turbine building programme is now in progress at the plant in connection with the Volga power development scheme. Turbines for this scheme are the largest that have been built at the Leningrad works, and will drive generators of 126 MW. output. The turbine rotors are 30 ft. 6 in. diameter and each complete turbine weighs 420 tons. Twenty such turbines have been installed in the Kurbushev power station and operate at 68 r.p.m., and at the time of our visit, similar units were under construction for the station at Stalingrad, where 22 turbines will eventually be installed. A typical turbine runner and casing are shown in Fig. 1, and it will be observed that the runner is of the feathering Kaplan type. An indication of the size of the runner can be obtained by comparing it with the workman seen below one of the vanes at the left.

During the next four years, similar turbines are to be built for other power stations on the Volga, in addition to those mentioned, and because of the large number that is required and the delivery dates that have been specified, new production techniques have had to be developed, to which reference will be made later in this article. Further developments in manufacturing methods are also planned in order to facilitate the building of hydro-electric generating equipment for the power projects on the main rivers in Siberia. Here, several new stations will be built, each of which will have an output of 4,000 MW. The turbines at these stations will drive generators of 200 to 300 MW. capacity, and it is planned to build and install this equipment within the next few years.

The water turbines mentioned so far have been of the conventional type, with vertical runner shafts and generators mounted above the runner casings. It may be noted, however, that two propeller turbines have been built with horizontal shafts, and these units are now being employed for trials and development work. Each turbine has a runner of 10 ft. 10 in. diameter, with feathering blades, which runs at 125 r.p.m. The runner shaft is mounted in bearings housed in a "torpedo," coaxial with the turbine casing, and the torpedo is supported by aerofoil-section struts at each end of the casing. A vertical strut at the down-stream end provides for the passage of the blade-feathering control shaft, and control vanes are mounted radially at the up-stream end. The 6,300-kW. generator surrounds the runner casing, and we were given to understand that the rotor of the generator is connected to the outer ends of the runner blades.

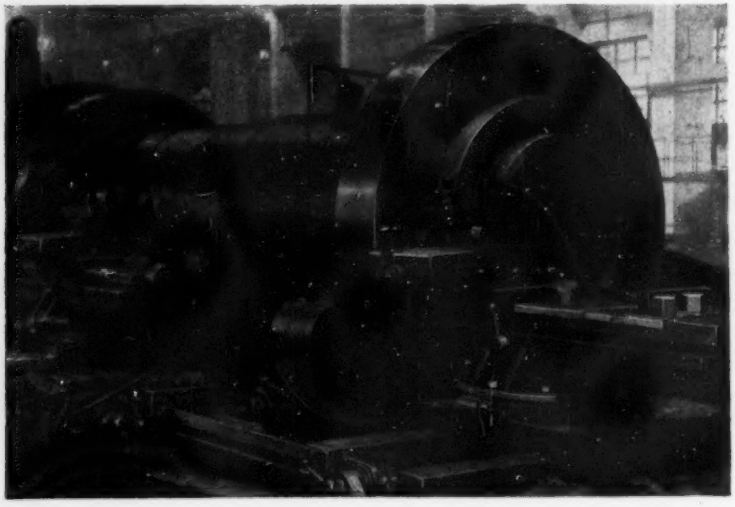


Fig. 2. Turning a large component for a steam turbine on a Craven lathe in one of the machining bays of the Metallic plant

STEAM TURBINE SHOP

Steam turbines are now built in a shop which was first laid down in 1928, with the collaboration of the Metropolitan - Vickers Electrical Co., Ltd. At that time, it was the only shop for the specialized construction of steam turbines in the U.S.S.R.,

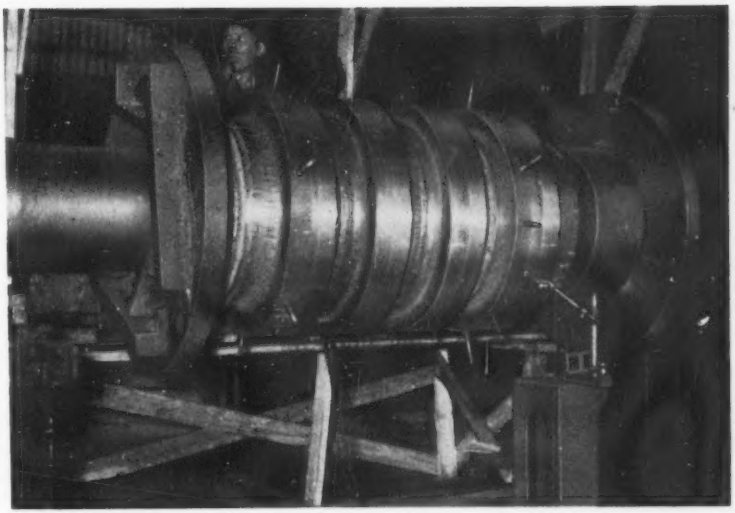


Fig. 3. This shaft for a large gas turbine has been built up, by electric arc welding, from seven components of austenitic stainless steel with a total weight of 6 tons

and even now 50 per cent of the Russian-built turbines are constructed here. The shop has been extended from time to time, and it now measures 656 ft. long by 180 ft. wide. It is divided longitudinally into two bays, one of which provides for heavy machining operations, and the other for the erection and testing of turbines. There are four gantry cranes in each bay, and, by using two cranes simultaneously, loads weighing up to 50 tons can be lifted. The height to the underside of the cranes is 59 ft. Turbine components are transported from the machining bay to the erection bay by means of an electrically-driven truck, which runs on rails in the shop floor.

At the time of our visit, three turbines were being built, and these units were for driving generators of 50, 100, and 200 MW. capacity. The largest turbine, which was complete, operates at a maximum pressure of 1,900 lb. per sq. in. This machine is being retained in the Metallic plant for research work, including investigations concerned with long turbine blades.

A variety of Soviet and foreign machine tools is installed in the machining bay, including a large Sellars vertical boring mill with a capacity for machining workpieces of 20 ft. diameter, also Schiess and Richards mills of similar size, all these machines being fairly old. There is a battery of Russian and other horizontal boring machines, among which we noted several by Giddings & Lewis, and a Skoda machine with a 7⅞-in. spindle and a 20-ft. column, which was engaged in machining a high-pressure cylinder.

Among the lathes were three large Craven machines which were about 10 to 12 years old. These lathes accommodate workpieces up to 8 ft. diameter, and the beds are 50 ft. long. A close-up view of one of these machines is given in Fig. 2, and they are mainly employed for machining shafts, although some outside contract work is undertaken. At the time of our visit, one of the lathes was being used for turning a large blooming roll for a works in the Leningrad area.

The plant includes heavy-duty balancing equipment for checking completely assembled turbine rotors. Since the rotor of a 200-MW. turbine weighs approximately 38 tons, special provisions are made for starting at driving shaft speeds as low as 2 r.p.m., with a very high torque. Other equipment included a rig developed in the plant for high-frequency induction heating rotor discs before they are shrunk on to the associated shaft. This method of heating is very rapid and it is stated that the temperature difference between the bore and the periphery of the disc is less than 30 deg. C.

Much work has been carried out at the Metallic plant in connection with rotor shafts of built-up welded construction. A shaft of this type has been fitted in a water turbine for the Kurbushev power station, and is of approximately 7 ft. diameter. When this article was being prepared, a large built-up rotor shaft for a gas turbine was being welded in the steam turbine shop, and a view of this shaft is given in Fig. 3. The shaft is made from seven rings of austenitic stainless steel, and has a total weight of 6 tons. Welding is performed by hand, using the electric arc process, and the time required for the complete welding operation is 1 month. When the shaft is finished, the maximum run-out must not exceed 0·3 mm. (0·011 in.). The gas turbine is designed to run at 3,000 r.p.m. and will drive a generator of 12,000 kW. capacity.

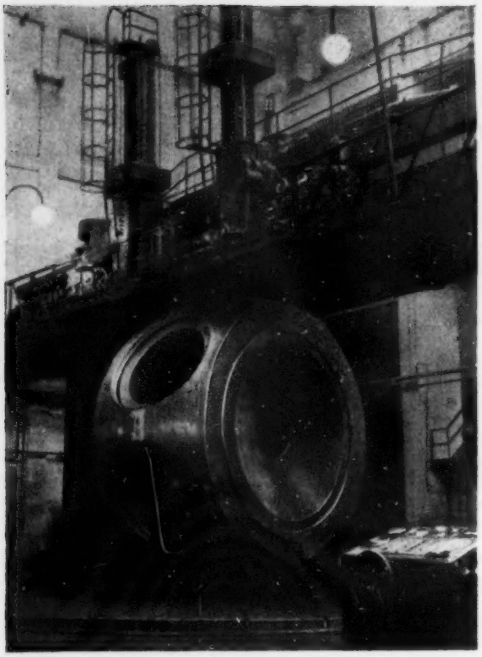


Fig. 4. Boring the apertures for the propeller blade shafts and seating flange registers in the body of the runner for a large water turbine on a Schiess-Defries turning and boring mill

WATER TURBINE SHOP

The water turbine shop, which was built in 1935, is 853 ft. long by 108 ft. wide, and comprises a central main bay, with secondary bays at either side. There are five gantry cranes in the main bay, the largest crane having a lifting capacity of 150 tons. Among the equipment installed is a cast-iron erection plate measuring 65 ft. square, but this plate is stated to be inadequate for building the largest turbine assemblies. There is a variety of very large machine tools, including some which have been specially built for operations on large water turbine components. When necessary, however, certain of the machines are also employed for operations on the larger components for steam turbines.

There are several conventional vertical boring and turning mills of the largest size, one of which was built jointly by a number of Leningrad plants, and has a table of 30 ft. diameter. At the time of our visit, this machine was being used for operations on the rotor of a Francis-turbine for a 85-MW. generator. This rotor was a steel casting, weighing about 75 tons, but it may be of interest to note that, in future, these components are to be fabricated by welding.

The largest machine in the shop is the Schiess-Defries vertical turning and boring mill seen in Fig. 4, which can be used for operations on workpieces weighing up to 180 tons. Diameters up to 50 ft. can be swung on the table, and the latter member is made in two parts, which are independently driven. The inner table is 20 ft. diameter and the maximum diameter of the outer ring is 36 ft.

In addition to that mentioned earlier, the Russian-built vertical boring mills include a Kolomna machine with a table of 13 ft. diameter, and a cross-beam which can be raised to a height of 10 ft. to facilitate loading. This machine has two power-driven spindles for machining holes, and trepanning-type cutters are used for this work, the core material being used for the production of certain small turbine parts. A Novosibirsk machine of similar type has a 23-ft. diameter table and can be employed for operations on workpieces with a maximum height of 16 ft. This machine was used at one time for turning the mounting flanges of water turbine propeller blades, but this work is now performed on one of the special machines which will be described.

SPECIAL MACHINE TOOLS

Specially-designed equipment for the production of water turbine components includes the large horizontal turning and facing machine seen in Fig. 5. This machine is employed for turning operations on the mounting flanges of propeller blades, and was designed and built by the Sverdlov Machine Tool Plant, which was described in an earlier article* in this series. The machine is of massive proportions and the headstock, seen at the right in Fig. 5, is mounted on a flat bed plate. T-slots are provided in the bed plate for securing three self-contained clamping units which hold the workpiece, and one of these units is indicated at *M*. For the machining operations, the propeller blade is held stationary, and the complete headstock unit can be traversed along guideways on the bed plate by means of a short, motor-driven, coarse-pitch screw, at one end, which engages a stationary rack, of arcuate cross-section, mounted between the ways.

The machine is driven by a motor of 100 h.p., and the headstock spindle is fitted with a facing

* MACHINERY, 93/288-6/8/58.

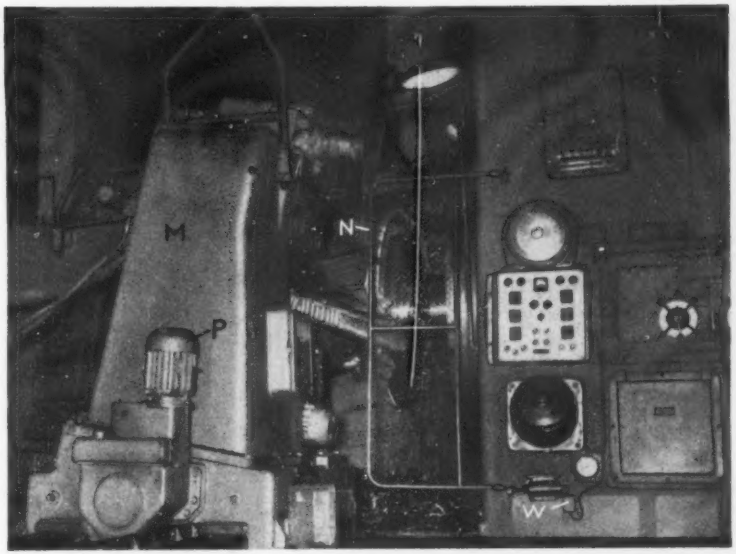


Fig. 5. This special horizontal turning and facing machine has been built by the Sverdlov works, Leningrad, to facilitate the production of propeller blades for large water turbines. The work is held by three clamp units and the tool is rotated in a special facing head

head, within the hinged wire-mesh guards *N*. The tool-carrying slide of this head can be traversed radially, under power, to permit of machining surfaces up to approximately 9 ft. diameter. The spindle can be driven at speeds up to 30 r.p.m., whereas when the workpiece was machined on a conventional vertical turning and boring mill, the maximum speed that could be employed was 10 r.p.m.

Switches and push-buttons incorporated in a control panel on the headstock provide for the application and release of the clamping units, and for the control of the traversing motions of the tool-carrying slide and headstock. The distances travelled by these two units are shown on large indicators, mounted above and below the control panel. Each indicator has a central dial for fine measurement which is surrounded by an annular calibrated ring for coarse measurement, the two members being coupled together by epicyclic gearing. There is a fixed cursor in front of both members, and the calibrations of the ring are seen through a rectangular aperture in the cursor, the calibrations of the dial being read with reference to an index mark on the lower part of the surrounding frame. The size of the dials and rings allows widely-spaced calibrations to be used, which enable readings to be taken from a considerable distance away.

Each of the clamping units *M* is mounted on the rectangular-section guideways of a sub-base, and can be traversed along these guideways by means of a coarse-pitch worm and rack. The rack is located between the guideways, and the worm is driven through reduction gearing by a flange-mounted electric motor, as indicated at *P*. Each clamping unit has a heavy column, set at an

Fig. 6. Close-up view of one of the clamp units on the Sverdlov machine, with a propeller blade in position. Each unit has two electro-mechanically operated clamping rams and a stop member which can be adjusted horizontally

angle of about 10 deg. to the vertical, and the column casting is roughly C-shaped. A yoke of heavy-section steel bar is fitted to the upper part of each column so that it may be lifted by means of an overhead gantry crane, and repositioned on the bed plate of the machine to suit different workpieces.

A close-up view of one of the columns is given in Fig. 6, and it may be seen that it has an adjustable ram *R*, which serves as a stop for locating the propeller blade in the horizontal direction. The upper and lower arms of the C-form house the clamping rams, protected by bellows-type covers as at *S*. These rams are advanced and retracted by electro-mechanical drive systems, and the motor for the lower ram is indicated at *T*. When the rams have been advanced into contact with the propeller blade *U*, they can be locked in position by hydraulically-powered mechanisms, and the cylinder for the upper ram is seen at *V*. Interlocking arrangements are incorporated to prevent operation of the machine unless the rams of each unit are in engagement with the work and are locked in position. The hinged guards at each side of the turning and facing head, as indicated at *N*, Fig. 5, are connected to sliding plungers which actuate limit switches, as at *W*. If these guards are not closed the machine cannot be started.

SPECIAL PLANO-MILLING MACHINE

After the mounting flange of each blade has been machined it is transferred to a large plano-milling machine, seen in Fig. 7, which has been specially developed for semi-finishing both sides of propeller blades simultaneously, and is equipped with an electro-mechanical copying system. Built by the Gorki Machine Tool Works, it has a table approximately 28 ft. long by 8 ft. wide, and the distance from the table to the underside of the cross-beam is 19 ft. 6 in. A power-operated carriage moves on twin flat guideways on each upright, and can be secured by electrically-operated clamps. Guideways in each carriage support a horizontally-disposed ram, and these rams can be moved towards and away from each other by power. At the end of the ram there is a support bracket which can be swung through 360 deg. about the axis of the ram, and

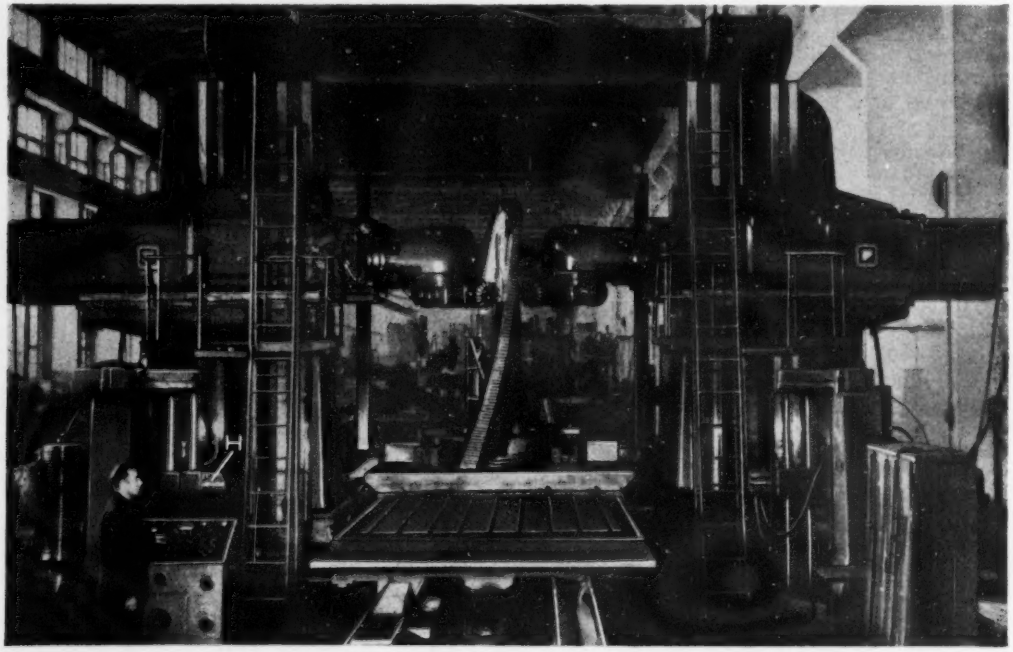


Fig. 7. The special duplex copy-milling machine built by the Gorki Machine Tool Works for semi-finishing the surfaces of propeller blades. Separate masters are provided for each head, and trip dogs on a drum at one side control the table traverses and the elevating motions of the ram carriages

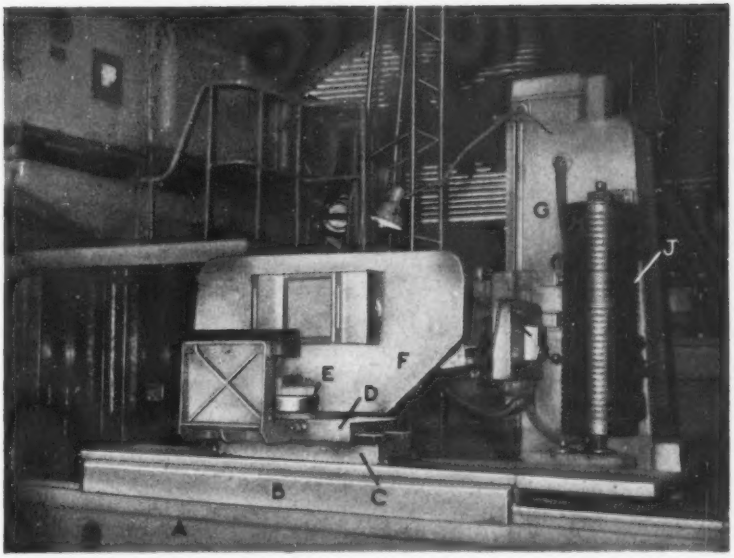


Fig. 8. Close-up view of the master and trip drum at one side of the Gorki profile - milling machine. The master is made one-fifth full size and an electrical follower unit is employed

the bracket carries a cutter head that can be pivoted through the 360 deg. on an axis at 90 deg. to that of the ram. The cutter spindle in this head is driven from a motor housed in the ram. Each assembly —comprising a carriage, ram and universal cutter head—is counterbalanced by twin chains and weights within the upright, and can be controlled independently from a pedestal at one side of the machine, also from a platform on the carriage.

Automatic control of the two ram units is provided by means of master and follower units at either side of the bed, and the unit at the left-hand side (as viewed in Fig. 7) also serves to control the movements of the table and the two carriages on the uprights. The water turbine blade is mounted on the table of the machine with the massive flange held in six self-contained hydraulic clamp units, which are secured to the table with T-bolts. Under automatic control, the table is traversed between the cutter heads, which mill both sides of the blade simultaneously, in a series of horizontal shallow grooves, in accordance with the forms of the masters. At the end of each traverse, the cutter head carriages are raised on the uprights by a predetermined amount, and the table motion is reversed, so that the next cut is made during the return movement of the table.

Fig. 8 is a close-up view of the left-hand master and follower unit, and the right-hand unit is of similar design, except where mentioned to the contrary. Each unit has a bed member *A*, with guideways for a table *B*, which can be power traversed in phase with the work-table of the machine, but at one-fifth of the work-table speed. The sub-base *C* of the master carrier is bolted to the table *B* and has a top member *D* which can be adjusted longitudinally. Pivotally mounted on the top member *D* is a support *E* to which the master *F* is secured. The master is made to one-fifth scale, and corresponds to one side of the propeller blade. By means of the adjustments, the master can be readily set in the correct position lengthwise and angularly to correspond to the setting of the work-piece after the latter has been clamped on the machine table.

At one side of the bed *A* there is a column *G*, with vertical guideways whereon slides a carriage which has dovetail ways for a horizontal arm. The end of this arm is indicated at *H* in Fig. 7. An electrical follower unit is adjustably mounted on the end of the arm by an arrangement similar to that employed for the cutter head of the machine, and the follower itself takes the form of a disc of 60 mm. (2·363 in.) diameter, to correspond to the cutters, which are of 300 mm. (11·811 in.) diameter. The follower-carrying arm can be adjusted transversely, and its carriage is raised and lowered under power, to correspond to the vertical setting of the left-hand machine ram, to a scale of one-fifth.

On the left-hand master and follower unit only, the column *G* also supports a drum *J*, and a lever-actuated switch *K* is mounted on a bracket that projects from the vertically-moving carriage of the column. A series of annular T-slots is machined in the drum, and the pitch of the slots is arranged to correspond, at one-fifth scale, to twice the vertical spacing of the milling cuts that are to be made on the propeller blade. Trip dogs are secured

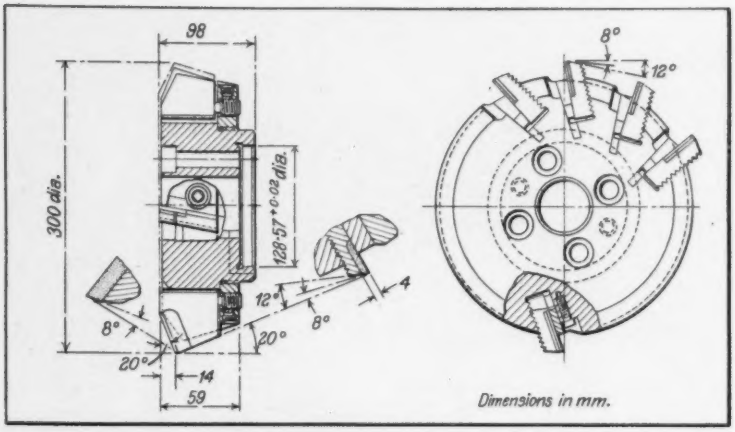


Fig. 9. Details of the tungsten carbide tipped, inserted tooth milling cutters employed for profile-milling propeller blades on the Gorki machine

to the drum by means of the T-slots, and angularly-disposed projections on the dogs lift or depress the lever of the switch *K*. The drum is oscillated in phase with the motion of the machine table, and the circumference of the drum is such that the distance (round the drum) between two dogs that are abutting corresponds to the maximum travel of the table.

With the workpiece and masters in the correct relative positions, and the trip dogs spaced correctly round the drum, the arrangements are such that, when the machine cycle is initiated, the machine table and the two follower tables move together. The workpiece is then traversed past the cutters, which produce a shallow arcuate cut on each side of the propeller blade, in accordance with the forms of the masters. At the end of the first cutting pass, the switch *K* is re-set by one of the trip dogs in the lowermost slot in the drum. In consequence, the motion of the work-table is stopped, the carriage on each upright of the machine is unclamped, both carriages are moved upwards by a predetermined amount, and the carriages are then re-clamped. At the same time, the follower carriage at each side of the machine is raised through a corresponding distance (to one-fifth scale). At the end of these re-setting motions, the machine table, workpiece and master are moved in a direction opposite to that of the first cutting traverse, and a second pair of cuts is made under control of the two masters. The length of this cutting movement is again governed by a trip dog on the drum, which resets the switch *K*, so that the cutters and followers are re-positioned before the workpiece and masters are moved in the same direction as for the initial traverse. This sequence of forward and reverse cutting traverses, with automatic resetting of the cutters and followers is repeated until both sides of the complete blade have been machined by a series of profile milling cuts. The switch *K* and its support bracket are moved upwards with the follower support arm of the left-hand unit, but the trip dogs are of an angular design, which ensures that the switch is actuated by both dogs in each drum groove, in spite of the small amount of upward displacement.

The cutters employed on the Gorki machine are of the inserted blade type, with mechanical clamping, and a typical cutter is seen in Fig. 9. Tungsten carbide tipped blades are used, and each blade can be adjusted individually by means of a dog-point screw in a ring which is screwed on to the cutter body. Each blade is held in position by a screw-actuated wedge. The cutting speeds employed range from 250 to 300 ft. per min., and the table feeds from 4 to 7 in. per min. Depth of cut ranges from 0·6 to 1 in., and the average life of the cutters between regrinds is stated to be 4 to 6 hours. Previously, using manually operated conventional machines, the milling of the surface of a propeller blade occupied 2,000 hours, but with the new machine only 100 hours are required, and a superior finish is obtained.

BLADE GRINDING MACHINE

Following the profile-milling operation, the blade is transferred to a special automatic grinding machine, Fig. 10, developed by the Kharkov Machine Tool Works. On this machine, each side of the blade is finished separately. The machine has a massive vertical column, of circular section, whereon swings an arm, fabricated by welding from steel sections. This arm incorporates guide-ways along which a carriage can be power-traversed. Two hydraulic rams are vertically mounted in the carriage, and to their lower ends is secured a self-contained, motorized grinding head, with a horizontal spindle carrying a large-

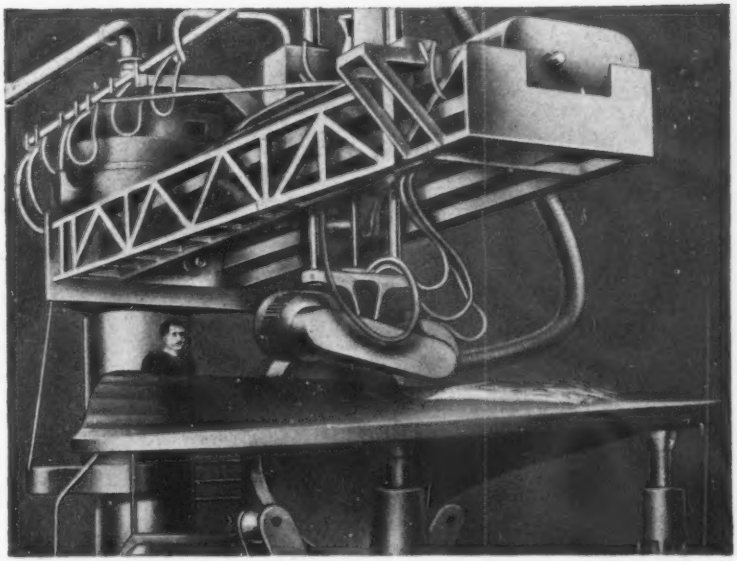


Fig. 10. General view of the special grinding machine built by the Kharkov Machine Tool Works for finishing the surfaces of water turbine propeller blades

diameter, cylindrical abrasive wheel. The propeller blade is mounted below the arm of the machine on adjustable supports which embrace the flange, and with the opposite end resting on adjustable jacks, so that the blade is in a nominally horizontal position.

In certain respects, the grinder resembles the special Robertson machine for finishing plough bodies which was described in MACHINERY, 89/1335—14/12/56, notably in that the workpiece itself acts as a master. The arrangement of the Kharkov machine is such that the arm is swung about the column, from side to side, so that it sweeps over the propeller blade, and the carriage is traversed along the arm in increments. A constant downward thrust is applied to the grinding head below the arm by the rams of the travelling carriage, so that a predetermined pressure is maintained between the grinding wheel and the surface of the workpiece, and the wheel follows the milled profile. The grinding head is moved over the work in a series of arcuate traverses, until the shallow ridges formed during the milling operation have been removed, and the milling cuts have been blended to form a smooth surface. The finishing operation on each side of the blade, including setting, occupies one shift of eight hours.

DOUBLE-END TURNING MACHINE FOR GUIDE VANES

The guide vanes for water turbines have integral shafts at each end, and a special double-

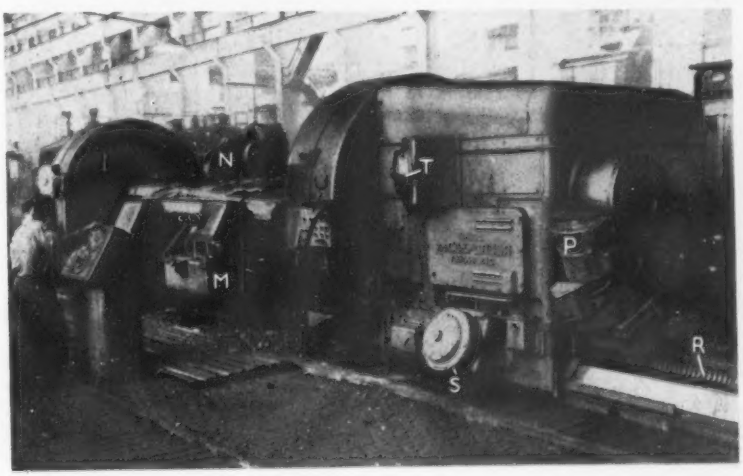


Fig. 11. The special double-ended Sverdlov horizontal machine for turning the shafts of guide vanes for water turbines at the Metallic Plant, Leningrad

end horizontal machine has been built by the Sverdlov plant for machining these shafts. This machine is shown in Fig. 11, and it may be observed that it is somewhat similar to other special-purpose machines described in the earlier article on the Sverdlov plant. The headstock units, moreover, resemble that of the machine for turning propeller blade flanges. A long bed, sunk below floor level, has inverted-V and flat guideways whereon are mounted two saddles, one of which is indicated at *M*. Each saddle is adjustable along the bed and can be secured by means of keeper strips, which engage the underside of the guideways. A cross-slide on each saddle can be adjusted transversely and locked in position. The guide vanes are of aerofoil section and on each cross-slide there is a massive cast support with a shallow V-form in its inner vertical face, with which the leading edge of the vane is engaged. The support on the saddle *M* is adjustable to facilitate alignment of the vane. At the end of each cross-slide remote from the support for the leading edge of the vane, there is a bearing surface for the under-side of the blade at the trailing edge. The vane is thrust on to this surface by a roller, carried at the end of a clamping arm, as indicated at *N*. This arm is of massive construction, and is swung downwards, or upwards clear of the work, by a motor-driven screw. The headstock unit at each end of the bed is driven by a 70-h.p. motor. A separate feed motor, as at *P*, is provided for traversing the headstock on the bed ways, drive being transmitted through reduction gearing to a coarse-pitch worm, which engages the arcuate-section rack *R*, between the ways. The travel of the headstock on the bed is registered on a dial indicator *S*, of the type that has already been described. A second dial indicator *T* is provided to register the movement of the tool-carrying slide of the large-diameter turning and facing head mounted at the front of the headstock spindle. Each headstock can be controlled from a push-button station, as at *U*, and a portable push-button unit is provided which is mounted on the end of a long cable for convenience when setting up the machine. Both headstocks can also be controlled from the pedestal seen at the left.

The spindle speeds of the headstocks range from 5 to 125 r.p.m., and the feed rates for the headstocks longitudinally, and the turning and facing slides transversely, from 0·0019 to 0·393 in. per rev., both the speeds and feed rates being steplessly variable. Before this machine was installed, the shafts of the guide vanes were machined on a conventional lathe. By using the Sverdlov machine, it is stated, the time for machining the shafts has been reduced by 70 per cent, and the finish of the machined surfaces has been greatly improved. The machine will accommodate workpieces with overall lengths from 13 to 23 ft., and with shafts of 9¾ to 15¾ in. diameter, the maximum length that can be turned being 5 ft.. Fig. 12 is a close-up view of one end of the machine during an actual turning operation, and in this instance the spindle speed employed was 125 r.p.m. and the feed rate 0·039 in. per rev.

Other special equipment installed in the water turbine shop includes a horizontal machine of similar design to that shown in Fig. 5, with a revolving cutter spindle that is radially adjustable in the facing head. This machine is employed for drilling and boring the fixing holes in the flanges of propeller blades, the holes being arranged on a pitch circle, concentric

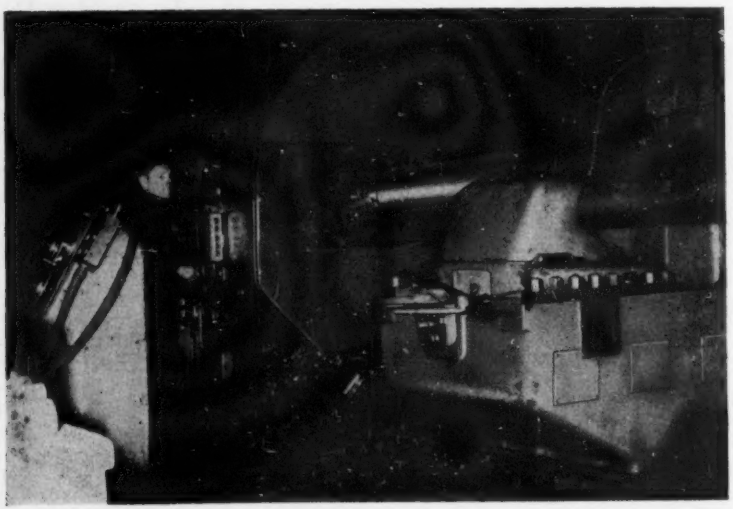


Fig. 12. Close-up view of one end of the Sverdlov machine during turning operations on the shaft of a large water turbine guide vane

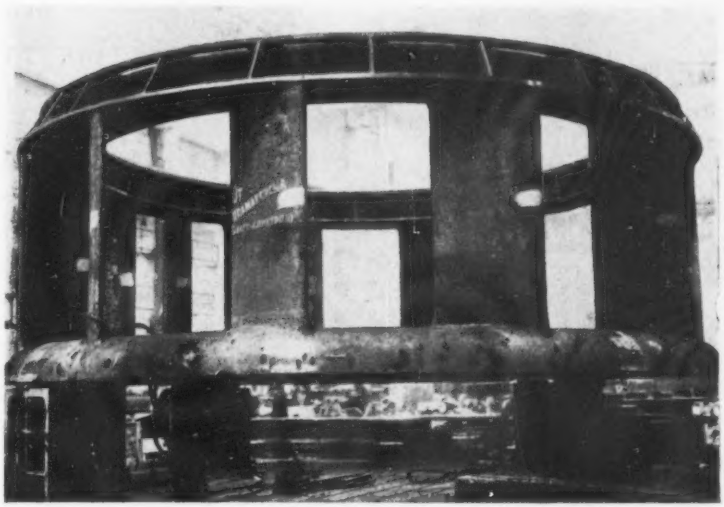


Fig. 13. The casing for a large water turbine which is built up from four steel castings. All the other major structural components are fabricated by welding

with the flange. Another machine provides for grinding the surfaces of the guide vanes. The wheel head is traversed along the cross-beam of a portal-type frame, which spans the reciprocating work-table whereon the blade is mounted. A very large horizontal turning and facing machine has been developed by the Sverdlov works, but was not installed at the time of our visit. This machine has a headstock that is similar to those already described, which can be traversed on inverted-V and flat guideways of a bed-plate. The spindle of the machine has a central boring quill, which can be advanced and retracted under power, and a large diameter facing head. At the facing-head end of the bedplate there is large circular, power-driven worktable sunk in the floor. There are hydraulic clamping units and jacks on the table for holding and supporting large workpieces, such as turbine hubs, while radial holes and tangential faces are machined. All movements of the head and table are controlled from a floor-mounted desk at one side. The headstock is driven by a 75-h.p. motor, and work up to 16 ft. diameter can be accommodated.

At the time of our visit, one of the 20 new turbines for Stalingrad was under construction. This unit has a rotor of 30 ft. 6 in. diameter, and a stator of 52 ft. 6 in. diameter. Electric arc welding is being widely employed for this machine, and the only major structural component that is not weld fabricated is the body, which is similar to that seen in Fig. 13. This unit is built from four steel castings and weighs 85 tons.

THE ELECTROSILA PLANT

As has already been intimated, the electrical equipment for the steam and water turbines built by the Metallic organization is supplied by the Electrosila Electrical Plant. This plant is situated on the western outskirts of Leningrad, and was established, 65 years ago, as an assembly shop for small machines made by Siemens Schuckert. Before the first world war, the employees numbered about 1,000, of whom about 900 worked in the shops, but the works were closed down during the war. Reconstruction of the plant began in 1922, and, following the introduction of State Programme for the Electrification of the U.S.S.R., the production of electrical generators of 500 to 1,500 kW. output was started in 1924.

In 1926, the building of generators for use with water turbines was initiated, and a machine, of 7,500 kW. output, was built for the first hydroelectric power station to be constructed in the U.S.S.R. Since that time, the plant has continued to build generators for both steam and water turbines, and during the period from 1932 to 1939, generators for steam turbines were developed and built which had outputs of 25, 50 and 100 MW. It may be of interest to note that the output of the largest machine was greater than the combined capacity of all the machines produced in a year, before the revolution.

The construction of electrical machinery was stopped during the second world war, and the plant was engaged in the production of munitions. At one time, the front line was only three miles from the works, and the plant suffered extensive damage from shelling and bombs, but continued to function. When the siege of Leningrad was raised, at the end of 1944, the reclamation of the plant was begun and, under government direction, plans were made to restore it to its pre-war condition over a number of years. The plant is now claimed to be not only

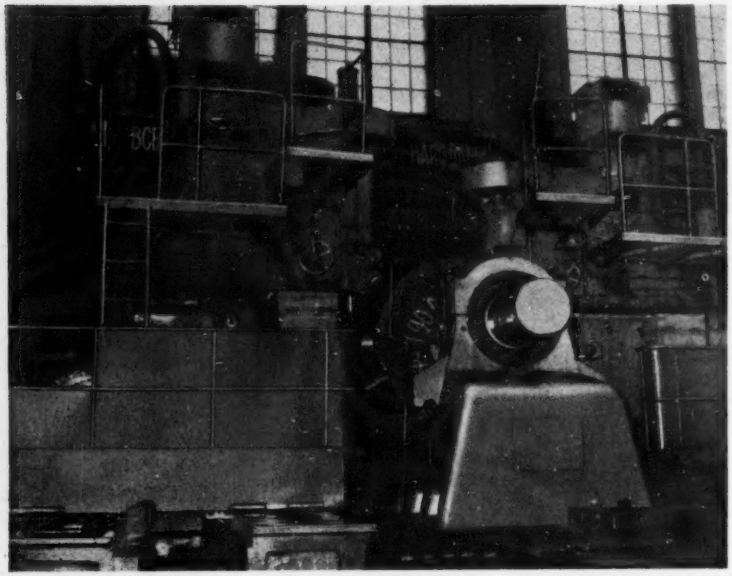


Fig. 14. Machining the rotor for a large synchronous motor on a Kolomna duplex milling machine at the Electrosila works, Leningrad. The workpiece remains stationary and the two milling units can be traversed in two directions on the bedways

the largest in the Soviet Union, but also in Europe, and builds generators and other equipment. Most of the generators are for Soviet power stations, and the capacity range is the same as before the war. It is planned, however, to build generators for steam plants with outputs up to 400 MW., and hydro-electric generators of 800 MW. capacity.

Many new shops have been built since the war, and about 10,000 people are now employed at the plant, some 7,000 workers being engaged in the production departments. Large A.C. and D.C. motors are built in addition to generators, and we were informed that the combined energy of all the machines made in a year is 2,000 MW. Before the second world war, many of the engineers employed in the plant studied in Great Britain, notably at Metropolitan-Vickers and C. A. Parsons, and there are still a few of these engineers in senior positions in the plant, including that of director.

There are two very large shops, one for building generators for steam turbines and the other for generators for water turbines. Before the war. most of the equipment was of foreign origin, but apart from German machines which were sent to the plant under the reparations scheme, only Russian-built machines have been installed since the war. The main erection bay of the steam-turbine generator shop has two overhead gantry cranes with 120-, 110- and 90-ton hoists, and there are two smaller gantry cranes of 10 tons capacity. In addition, travelling jib cranes are installed along each wall. There are similar lifting facilities in the adjoining heavy machining bay. Most of the plant in this bay appeared to be fairly old, but had been maintained in good condition. In Fig. 14 is shown a large duplex milling machine built by the Kolomna Machine Tool Works. The machine has an independent vertical milling unit at each side of the bed, and the column of each unit can be traversed crosswise on guideways in a sub-base, which, in turn, can be moved longitudinally on the twin rectangular guideways of the associated base. In the illustration, the machine is seen set up for milling flat faces along the sides of a rotor for a large synchronous motor. The rotor is of 4 ft. diameter, and 18-in. facing cutters are used, which have inserted blades with carbide tips. A face-milling head is secured to each column and is driven from the vertical milling spindle.

A number of large generators was under construction in the erection bay, and some had reached the final-test stage. These units included a 30 MW generator with an experimental water-cooled stator which will eventually be installed in Leningrad. Hollow stator bars are employed and each has an inlet and outlet pipe, of a special grade of rubber, for the cooling water. A new range of water-cooled generators for steam turbines is being developed in which the bars are grouped for cooling purposes, the water supply arrangements being thus simplified. The general trend of development at the Electrosila plant is towards generators with water-cooled stators and forced hydrogen cooling for the rotors. A small experimental machine has been designed, however, in which both the stator and rotor are water cooled.

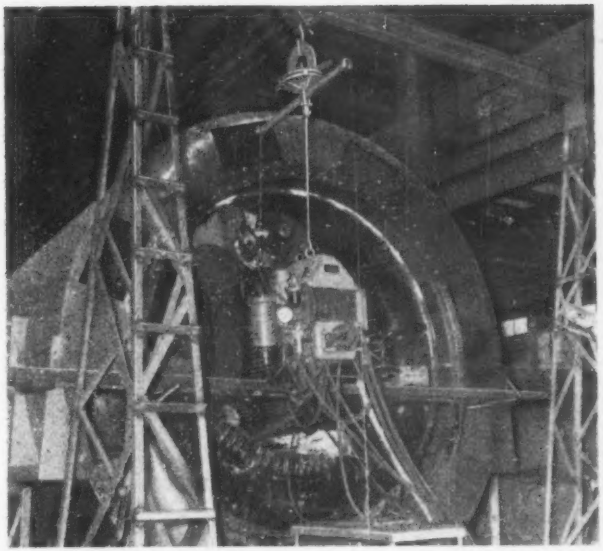
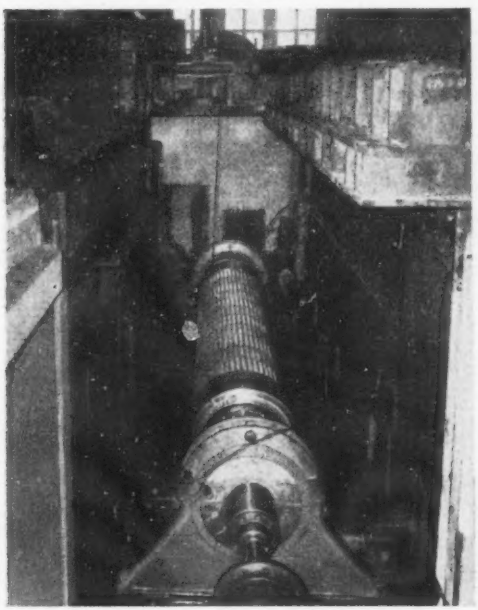


Fig. 15. Spot-welding the windings to complete the circuit in the stator for a generator to be used in conjunction with a large steam turbine

Among the machines under construction was a generator of 60 MW. output, and in Fig. 15 spot welding operations are seen in progress on the stator windings of this machine to complete the electrical circuit.

At one end of the erection bay there are pits for the balancing and overspeed testing of rotors, and a view of one of these pits is given in Fig. 16. Balancing is carried out with the rotor supported by its own journals, and portable electronic equipment is used. The maximum distance between the support bearings is 26 ft., and rotors of 3 ft. 4 in. maximum diameter can be tested. Rotors can be driven at speeds up to 3,600 r.p.m. by a motor of 4,700 h.p., and it is the usual practice for generators to be designed so that the normal operating speed lies between the first and second critical speeds. The rotor seen in Fig. 16 is of the hydrogen cooled type, and has internal passages for the flow of hydrogen, these passages being connected to scoops on the periphery of the rotor. The scoops are arranged in groups, those in one group facing in one direction, and those in the next group, in the opposite direction. As the rotor is rotated, hydrogen is picked up by the scoops that face in the direction of rotation, is forced through the internal passages, and is discharged from the scoops in the next group.



The hydro-generator shop has separate machining and welding bays, and in the latter bay, at the time of our visit, there was a large stator for a generator to be installed at Stalingrad. Welding is being increasingly employed for the stator frames and other structural members of large hydro-generators, and this example was of approximately 50 ft. diameter. Special care is necessary to avoid distortion, and considerable attention is given to the method of supporting the work and the sequence of the welding operations. It is claimed that close limits can be maintained, and that, in this instance, important dimensions were held to a tolerance of ± 0·5 mm. (0·020 in.). Using the submerged arc process, steel plates up to 200 mm.

Fig. 16. One of the overspeed test pits in the steam turbine generator shop at the Electrosila Works, Leningrad. A hydrogen cooled rotor is seen being prepared for testing and balancing with portable electronic equipment

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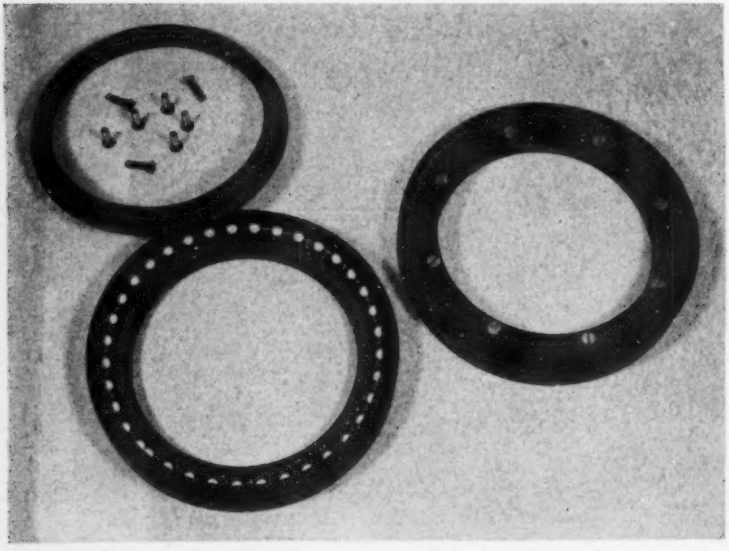
(7¾ in.) thick have been welded satisfactorily, and it is intended to employ welding for the construction of rotors for large hydro-generators.

Various heavy machine tools are installed in the machining bay of the hydro-electric generator shop, including a large vertical turning and boring mill built by the Starakramatorski Machine Tool Plant. It has capacity for machining workpieces up to 32 ft. diameter by 13 ft. high, with weights up to 200 tons. A Ward-Leonard system is employed for the main drive, the motor-generator set being of 225 h.p. There are two angularly adjustable tool rams, and all motions are controlled from a pedestal at one side, as well as from separate stations on the cross-rail. This machine was installed in 1952, and we were informed that boring mills of similar design have since been built with a capacity for machining workpieces of 60 ft. diameter. At the time of our visit, the turning and boring mill was being employed to machine the bore, end-face and certain seating faces on the housing for a 7,500-h.p. D.C. motor. The housing was 14 ft. diameter by 6 ft. high, and the machining operations required 200 hours.

Ball Bearings Made from Plastics

The ball bearing shown in the accompanying illustration is made entirely from plastics with the exception of the aluminium screws. Designated No. 85, this bearing is one of several types made by Aircraft Armaments, Inc., Cockeysville, Maryland, U.S.A., and is employed in the mounting for a 0·30-in. calibre machine gun on a tank landing craft. Designed to replace a steel bearing, the plastics assembly has a diameter of approximately 10 in. and incorporates two rows of balls. The load-carrying balls are of 0·406 in. diameter and are separated by idler balls of 0·394 in. diameter, which act as spacers. Excess loads, which have the effect of compressing the larger balls slightly, are carried partly by the idler balls. The balls employed in this bearing were centreless ground from cast phenolic resin rod material, but for other heavier-duty applications moulded phenolic or melamine resins could be employed.

Bearing races are machined from linen-reinforced phenolic tubing and although aluminium screws were employed in this example, it is stated that they too could be made from plastics material if it was essential that metallic materials should be avoided. Before the bearings were accepted for installation they were subjected to tests which included the equivalent of firing more than one million rounds of ammunition from a machine gun, and application of acceleration loads to simulate actual conditions of service. Such tests exceeded requirements for the normal life of the turret in question, and after they had been completed, the bearings were found to be in excellent condition with no signs of wear or "Brinelling" indentations. The weight of the plastics bearing is only 20 per cent, and the cost about 33 per cent of that of a steel equivalent, despite the fact that it is being made in limited quantities.



This plastics bearing for a machine gun mounting has races of approximately 10 in. diameter

Electronically-controlled Press Feed for Transformer Lamination Strip

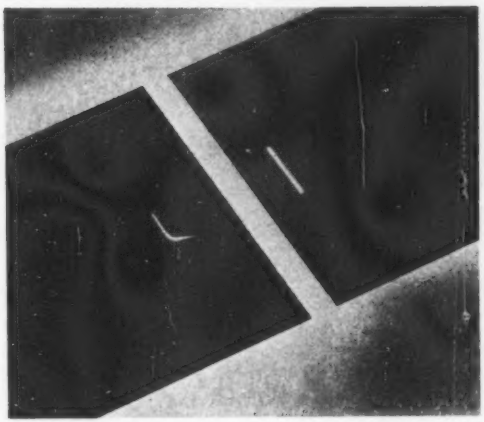


Fig. 1. Lock-wound laminations are connected together by means of an interlocking tongue and slot, as here shown

In MACHINERY, 92/888—18/4/58 an article was published on the flow-line methods employed by Ferranti, Ltd., at their West Gorton works, Manchester, for the manufacture of distribution transformers up to 1,500 kVA., 33 kV. rating. The range includes small single-phase types, extensively employed in rural electrification, which incorporate what are termed lock-wound cores, to enable more effective material utilization to be obtained.

These lock-wound cores are built up of laminations of cold-reduced, grain-orientated electrical steel ranging from 60 to 70 in. long and 1½ to 4 wide, and each has a slot at one end and a tongue at the other, as shown in Fig. 1. The slot in one strip is engaged by the tongue in another as the core is being wound.

The laminations are produced from 0·014-in. thick, gang-slit, coiled material, on a Hordern, Mason & Edwards L40 geared, adjustable-stroke, press of 40 tons capacity, to which the company have fitted a motorized coil cradle and a fully-automatic feed unit, whereby laminations of any length required can be cut to an accuracy of ⅛ in. A description of the follow-on press tool employed was included in the previous article, and some details can now be given of the arrangement of the coil cradle and feed unit, which was developed and built by the B.H.P. Machine Tool Co., Ltd., in co-operation with Ferranti, Ltd. The unit can also be used for the manufacture of laminations for conventional cores.

A general view of the installation is given in Fig. 2, and Fig. 3 shows

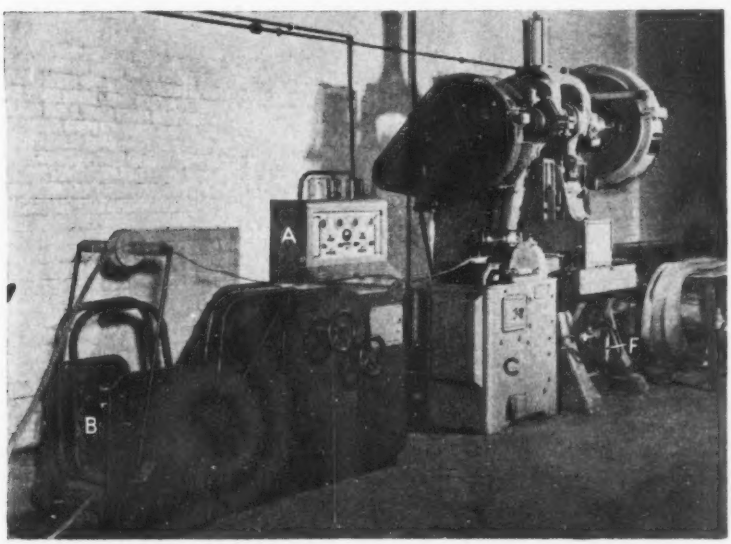


Fig. 2. H.M.E. power press with automatic feed arrangement for producing laminations for lock-wound cores

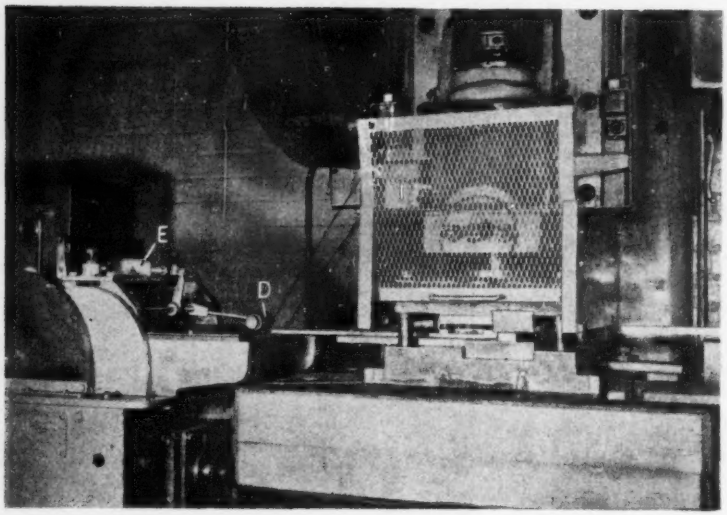


Fig. 3. Close-up view of the tool and the outlet side of the feed unit adjacent to H.M.E. 40-ton power press

the press tool, with the feed unit on the left. The required length of feed is pre-set on a Londex electronic controller, seen at *A* in Fig. 2. The coil cradle has a variable-speed drive which is adjusted to a speed depending upon the length of lamination being produced and is arranged to operate by means of a relay while the feed mechanism is feeding strip to the press. The strip is taken from the coil between adjustable side guide plates *B*, and over two guide rollers, to a pair of power-driven feed rolls in the unit *C*. Referring to Fig. 3, at the outlet side of the feed rolls, the strip passes beneath a roller *D*, mounted on a pivoted arm which is lifted should the strip buckle because of incorrect feeding, and a safety switch at *E* is then operated to stop the feed-roll driving motor.

Drive from the motor of the feed unit is transmitted through a Warner electro-magnetic clutch (Westool, Ltd.) to a reduction gearbox which provides a strip feed rate of 40 ft. per min. To ensure an accurate cut-off length, a secondary gearbox is also incorporated, which is brought into operation, by another electro-magnetic clutch, to reduce the rate of feed towards the end of the movement, and finally a brake is applied.

The required strip length, in units of $\frac{1}{64}$ in., is pre-set by means of four knobs on a panel, which represent units, and units $\times 10$, $\times 100$ and $\times$ 1,000. Control of the feed-roll drive is then effected through the medium of four dekatron counters, operating in conjunction with a photo-electric cell and a large-diameter slotted disc, which is driven at increased speed by spur gears from the lower feed roll shaft. As the disc rotates, each slot, representing $\frac{1}{64}$ in. of feed, allows a beam of light to shine on the photo-electric cell and thus causes an electrical impulse to be generated which is transmitted to the control panel. Upon completion of the pre-set count, the feed drive is stopped and braked, and the press clutch is engaged by means of a Maxam air cylinder controlled by a solenoid valve. This pneumatic control has been applied to the existing clutch pedal, as seen at *F* in Fig. 2. During the press stroke, a cam on the left-hand side of the crankshaft operates a switch to re-set the Londex control unit, and initiate the next feed cycle. The laminations are picked up after cutting by a small conveyor and carried to a pallet.

TACCY DUST BARRIER—The method of arresting or collecting dust by means of adhesive impregnated dusters and mats which was developed by Anti-Dust Services, Ltd., Dudley, Worcs. (formerly known as A.D. Tack Rags and Adhesive Dusters, Ltd.), has now been applied to screens, which can be employed for enclosing machines or processes that produce dust, or from which dust must be excluded. An open weave material has been developed which is impregnated with a non-drying adhesive, and can be attached to light-section steel angle frames to form screens. These screens can be arranged to provide complete enclosures, with four walls and a ceiling, half-tunnels, corner enclosures, and T-shaped erections.

A wide range of standard steel angle strips is available, with an aluminium finish, whereby enclosures of any length, width and height, in multiples of 30 in. can be constructed. The screens can be provided with castors to facilitate movement from one site to another. It is stated that, when new, the adhesive-impregnated material does not impede light or natural ventilation to any appreciable extent.

Operations on Ford Rear Axle Differential Spiders

Spiders, which carry the intermediate gears in the differential assemblies employed in Ford commercial vehicles, are made in a range of sizes to suit the different vehicles and are machined from special steel forgings of cruciform shape with pierced central bosses. A drawing showing a typical finish-machined spider for a large vehicle is given in Fig. 1. Before they are machined, the forgings are subjected to a heat treatment cycle which includes heating to 1,550 deg. F. and quenching in oil, followed by tempering at 1,000 deg. F. to obtain a Brinell hardness of 241 to 286. Pickling is then carried out to remove scale and the central boss of the forging is coined to a thickness of 0·865/0·875 in. on a Craig & Donald (Scottish Machine Tool Corporation, Ltd.) 500-ton press. A B.S.A., 6- by 20-in. automatic lathe is then employed to turn the outside ends of the four arms to the nominal diameter of 7·000/7·010 in., after which the bore of the central boss is enlarged to 1·697/1·700 in., on a Pollard 21-in. drilling machine, for location purposes.

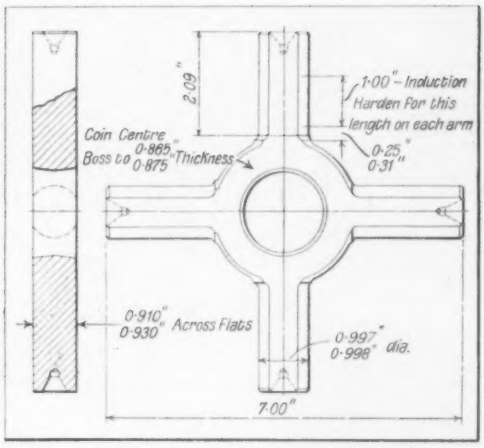


Fig. 1. The differential spider which carries the intermediate gears in the rear axles of large Ford commercial vehicles is machined from an alloy steel forging

At the next operation on the spider, the four arms are turned to a common diameter of 1·025/1·030 in. for a length of 2·09 in. and the outer ends are drilled and chamfered, and this work is performed on a special Witzig & Frank (B.P.S. Machinery & Spares Co., Ltd.) double-ended hollow turning machine, a general view of which is given in Fig. 2. From this illustration it will be observed that the machine has a long bed with a spindle

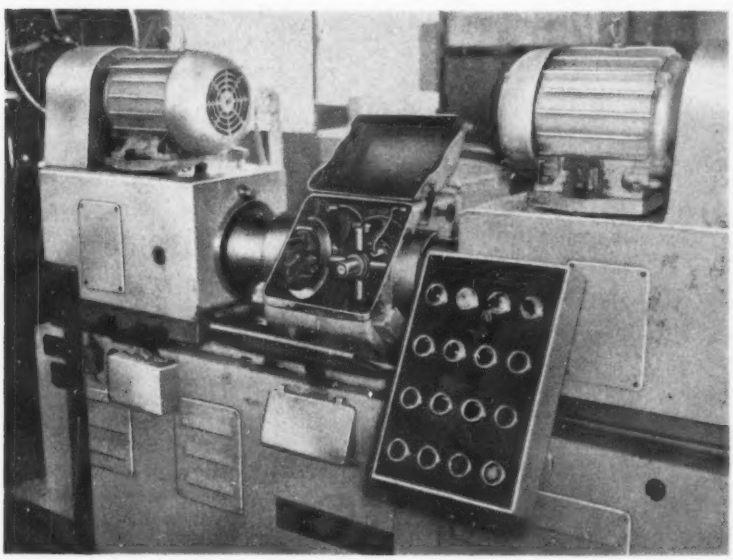


Fig. 2. General view of the Witzig & Frank automatic machine for hollow turning, chamfering and centre-drilling the four arms of the differential spider

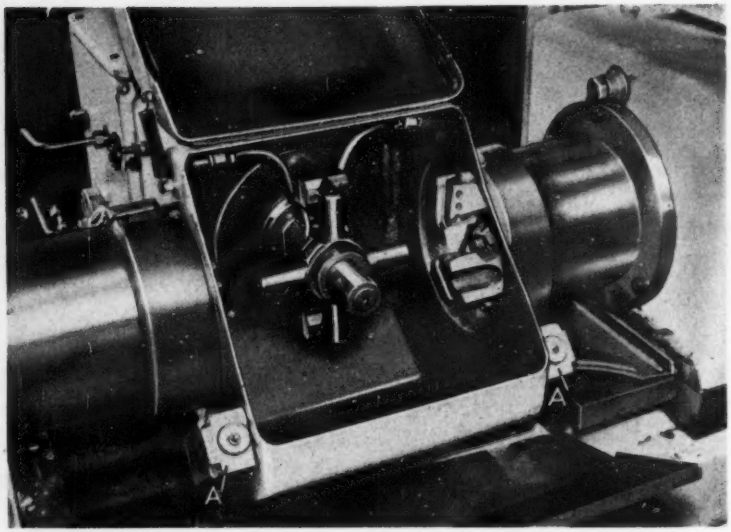


Fig. 3. Close-up view of the work-holding arrangements and tooling on the Witzig & Frank machine. Following the initial turning operations on the horizontal arms, the component is indexed through 90 deg. to bring the other arms into position

head at each end, arranged to slide on the bedways. An extension at the rear of the machine carries the work-holding spindle, on which the spider is positioned by its bore, angular location being provided by spring-loaded V-blocks arranged to engage the two vertical arms of the forging.

Some further details of the work-holder and of the tooling on the spindle noses may be seen in the close-up view, Fig. 3, the component being clamped on the spindle by means of a loose C-washer and draw-bar. The spindle is indexed through 90 deg., by an automatic mechanism within the housing at the rear, after the completion of the turning, chamfering and centre-drilling operations on the two horizontal arms, to enable the other two arms to be machined. Each machining head is equipped with two turning tools which share the total cutting load, also a single chamfering tool and a centre drill, and is driven at a speed of 1,120 r.p.m., to provide a cutting speed of 330 ft. per min.

Loading and clamping of the spider is accomplished with the aid of the push-buttons on the panel at the right in Fig. 2, and the automatic cycle cannot be started until two microswitches *A*, Fig. 3, have been operated by the action of closing the guard, which completely encloses the cutting area and confines flying chips. The two spindle heads

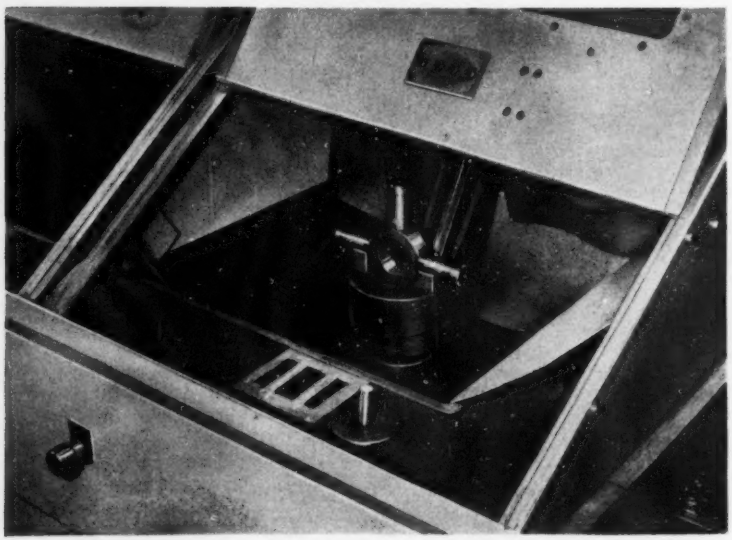


Fig. 4. An area near the boss end of each arm is induction hardened to a depth of 0·060/0·080 in. on this general purpose unit which is supplied by a generator of 60 kW capacity

are advanced at a rapid traverse rate, by electric motors, to the cutting position, and the feed rate, which is steplessly variable, is then engaged at 0·0045 in. per rev. for the cutting operation. During the machining cycle, the heads are fed by means of hydraulic motors, and after the heads have reached full depth they dwell momentarily to permit escape of chips from the spaces between the tools and the work. The rapid-traverse drive is then engaged to retract the tools to the position shown, and the central shaft carrying the spider is indexed to bring the vertical arms to a horizontal position.

When the machining cycle has been repeated, the heads are again retracted and the spindles are stopped in readiness for unloading. Soluble oil coolant is employed, and the cycle time for turning the four arms is 1·10 min. Rough grinding of the arms to a common diameter of 1·003/1·007 in. is next carried out on a plain cylindrical machine, which operates on one arm at a time, and the components are then inspected. Subsequently, the arm surfaces are induction hardened for a distance of 1 in., near the central boss, to a depth of 0·060/0·080 in., on a general-purpose unit supplied by the English Electric Co., Ltd., as shown in Fig. 4.

This unit consists of a series of cabinets, with sliding transparent panels at the front, in which provision is made for mounting some 18 different designs of inductor, for the treatment of various axle components produced in the shop. These inductors are supplied with high frequency current by a generator of 60-kW. output, which can be connected to any of the cabinets, as required. With the set-up shown in Fig. 4, the spider is located in the inductor coil which is fitted with a spray type quench ring, and the current is switched on for a controlled period of 5 sec., followed by the water spray for 9 sec. This procedure is repeated for each of the spider arms, and the surfaces are thus hardened to 60 to 65 Rockwell C.

Finish-grinding of the arms to a diameter of 0·997/0·998 in., with a surface finish of 27 micro-in. C.L.A. is then carried out on a 12- by 24-in. Newall machine, after which the flats shown in Fig. 1 are formed by surface grinding on a Lumsden machine. Finally, the spiders are de-burred, de-magnetized, inspected and passed to the assembly lines.

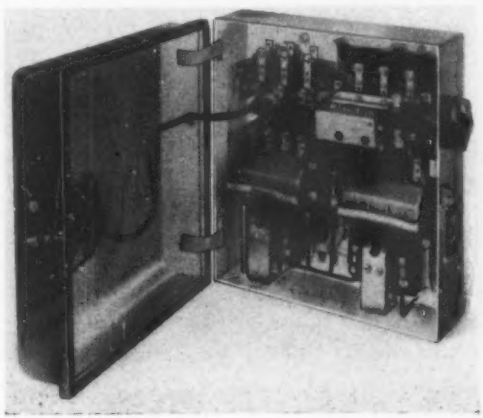
G.E.C. Reversing Starters

A range of direct-to-line reversing starters, incorporating vertical-lift contactors similar to those in their XB and XC non-reversing types, has been introduced by the General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2, for starting motors of 1 to 12½ h.p.

An example from the new range is shown in the accompanying illustration. The 4-pole forward and reverse contactors are interlocked mechanically so that when either is closed, the other is locked open, and there is a further electrical interlock through side switches operating in conjunction with each contactor, which prevents the two operating coils from being energized together. Additional side switches for controlling associated circuits can be fitted, if required. The triple-pole overload units have adjustable oil dash-pot time lags.

Any starter can be supplied with a cam-operated, double-break, triple-pole, interrupter switch, capable of breaking the stalled motor current. The 10-h.p. and 12½-h.p. sizes have a plug-in mounting which permits removal without disturbing incoming and outgoing cables.

Push buttons for "forward," "reverse" and "stop/reset" control are mounted on the case, and motors may be controlled remotely, if desired, by push buttons or pilot switches. An ammeter can be fitted on top of the case, and accommodation for control fuses is available inside the starter.



G.E.C. Reversing Starter Showing the 4-pole Vertical-lift Contactors

Optical Location System for a Turret Punch Press

An optical locator has been combined with a conventional stylus system to extend the field of application of an 80-ton turret punch press. Built by the Wiedemann Machine Co., U.S.A., the RA-101 press is shown in Fig. 1, and it is stated that the equipment permits savings in the preparation time for punching panels measuring up to 48 by 60 in. at a single setting, or 48 by 120 in. at two settings.

These savings are obtained because detailed shop drawings are not required. Only the outside dimensions of the blank need be given. With a rough sketch as a guide, a sub-template for each opening is taped or pasted on to a sheet of transparent vellum. This non-dimensioned master drawing is reproduced photographically on two sheets of sensitized paper, one opaque and one transparent. (Paper shrinkage or stretching is held to a minimum during this process.)

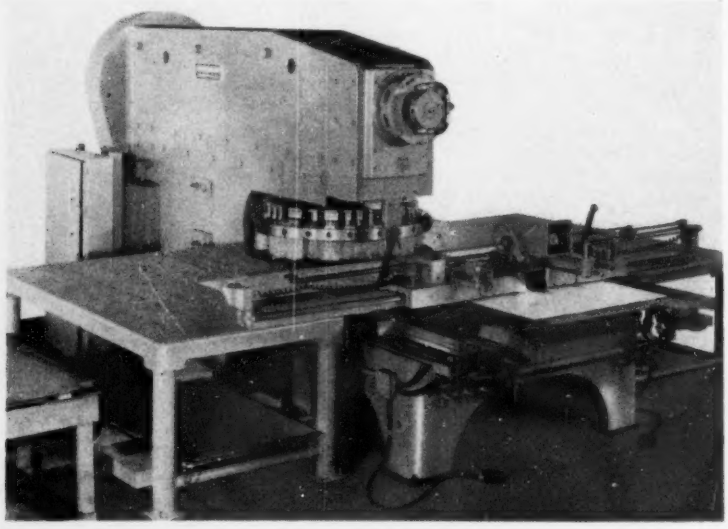


Fig. 1. Wiedemann turret punch press equipped for both optical and stylus hole location

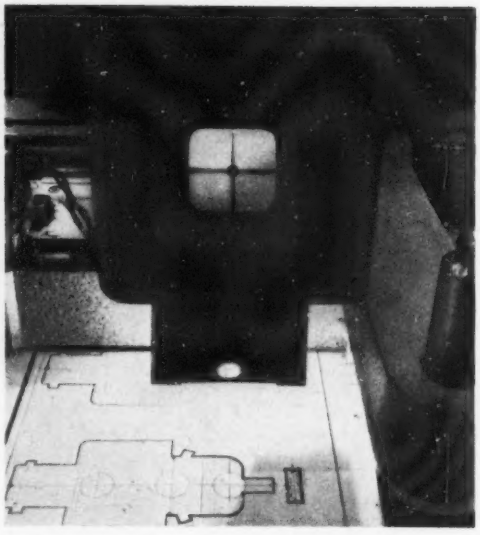


Fig. 2. A hole location on the photo-copy of the master drawing is projected on the ground-glass screen of a 10× magnification optical viewing head

The transparent photo-copy is used for checking hole location on the finished part, and the opaque copy serves as a template and is held to a vacuum table on the punch press. With the work blank in position, the cross-slide is moved until the centre lines of a hole location on the template are aligned with the cross hairs on the ground-glass screen of a 10× magnification optical head, as seen in Fig. 2. After tripping the press, the operator locates the next hole in the same manner.

This photographic template method is intended only for small batches. If a number of identical parts is to be made, ¾-in. diameter holes can be punched in the first piece at the various locations. This piece can then be used

as a template, in conjunction with the conventional Wiedemann stylus to increase speed of operation and ensure positive hole duplication.

Change-over from optical to stylus control, or vice versa, is simplified by the fact that both units are mounted on a movable locating head. This head can be unlocked and indexed to left or right to bring either the optical system or the metal stylus into the operating position. Interlocks ensure correct operation of the machine when either unit is in the control position.

The Wiedemann Machine Co. are represented in this country by Dowding & Doll, Ltd., 346, Kensington High Street, London, W.14.

Installation for Hot-forging Stainless-steel Bolts

A hot-forging installation for the production of stainless-steel bolts has recently been put into operation by Sandiacre Screw Co., Sandiacre, near Nottingham. The stainless-steel billets are induction heated in the Wild-Barfield furnace seen in Fig. 1, which is capable of raising a ⅝-in. diameter billet to a temperature of 1,150 deg. C. in 8 sec. This type of furnace was installed because it provides for fast and localized heating. In addition, distortion is avoided, and scaling is reduced. Quantity-production, hardening, tempering, brazing, and soldering can also be undertaken with this equipment, which can readily be changed over from one type of work to another.

The forging temperature is controlled automatically, to ensure uniformity throughout a batch, and the desired grain formation in the heads of the bolts.

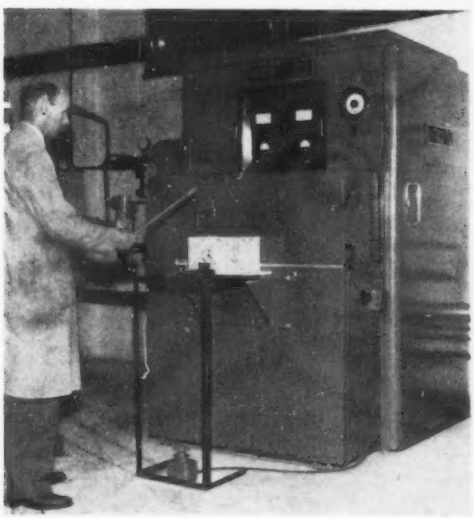


Fig. 1. The Wild-Barfield induction heating furnace installed at the works of the Sandiacre Screw Co. for heating stainless-steel bolt billets prior to a hot-forging operation. A ⅝-in. diameter billet is heated to 1,150 deg. C. in 8 sec.

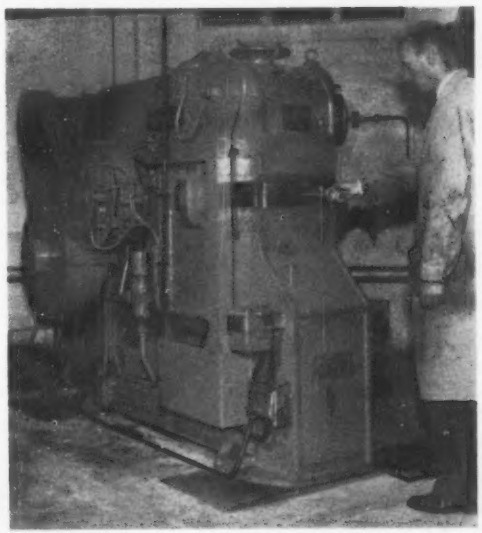


Fig. 2. After being heated, the stainless-steel billets are hot-forged in this Eumuco split-die press

From the furnace, heated billets are transferred to an adjacent forging press, which can be seen at the extreme left in Fig. 1, also in Fig. 2. This German-made, Eumuco (Wickman, Ltd.), machine is of the split die type. Short bolts can be produced by cropping from the bar, and the flash left after the forging operation, which is on the top of the head, can be removed during the normal facing operation.

It is stated that the stainless-steel bolts produced by this plant have increased strength and accuracy, also improved appearance. Furthermore, it is claimed that, as a result of the improved grain formation, there is less likelihood of fatigue cracks

occuring at the junction of the head with the shank, than with bolts which are machined from solid bar material. In addition to the technical advantages mentioned above, there are important savings in material. By using the hot-forging technique, the weight of material saved, per gross, as compared with that required for bolts turned from bar, ranges, for example, from 17 lb. for a ⅝-in. diameter by 2-in. long size, to 196 lb. for a ¾-in. diameter by 6-in. long bolt, these figures representing, in each case, an economy of the order of 50 per cent. It is estimated that the company will obtain an overall saving of some 70 tons of stainless steel per year.

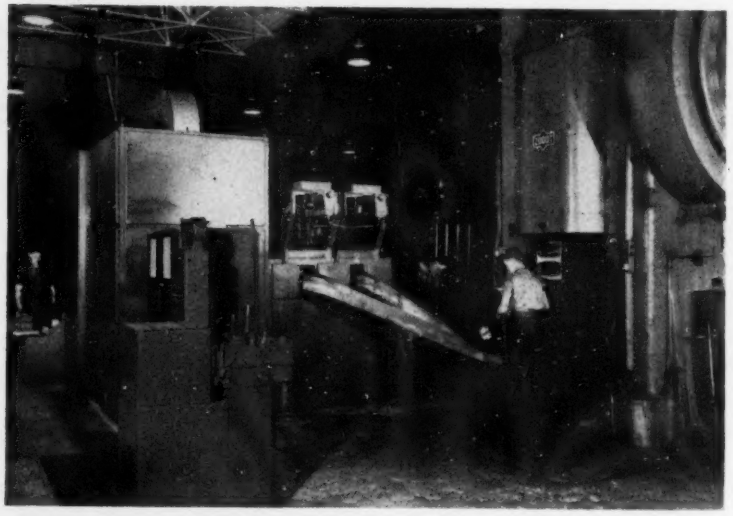
Birlec Dual-frequency Billet Heating Installation

A 400-kW., dual-frequency, billet heating installation has recently been supplied by Birlec, Ltd., Tyburn Road, Birmingham 24, to Forgings & Presswork, Ltd., Birch Road, Birmingham 6, for operation in conjunction with a Massey high-speed forging press.

With this equipment, which is shown in the figure, pre-heating of billets, to a temperature of 700 deg. C., is carried out with current at mains frequency, and a high-frequency supply, at 3 kilocycles per sec., is provided by a B.T.-H. motor alternator for the final stage of the heating cycle, to bring the billets to the forging temperature. In consequence, a high-freqeuncy generator of only fairly small capacity is required, and rapid heating of the billet ensures that the formation of scale is reduced to a minimum.

Apart from the loading of unheated billets on to an elevator, the equipment is automatic in operation, and is designed to deliver heated billets continuously at pre-determined intervals, to inclined chutes, down which they slide by gravity towards the forging press. It will handle from 7 to 20 cwt. of steel billets per hour. There are two horizontal heating units each fitted with mains- and high-frequency coils which are brought into use alternately by the action of air-operated, pusher-type, billet feeding mechanisms. Interchangeable coils are supplied for heating of billets of various sizes up to 4 by 4 in. cross-section by 7 in. long.

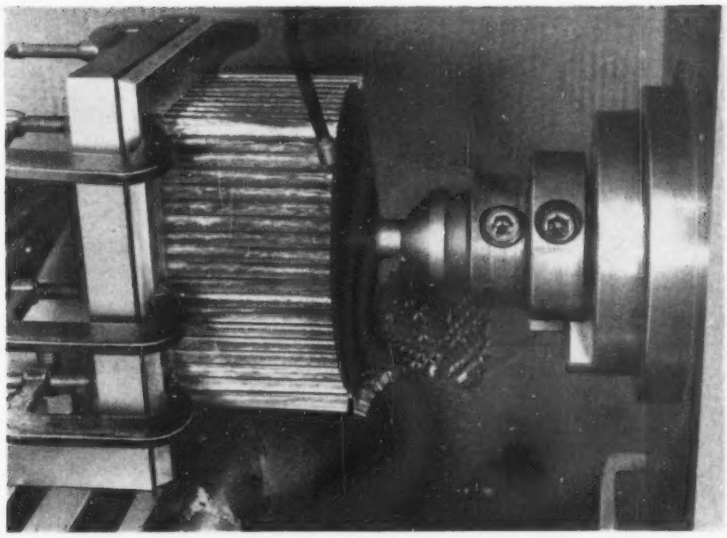
Thermally-insulated tunnels are provided between the pre-heating and high-frequency coils, which ensure that heat losses are reduced to a minimum when the billets are being transferred from one position to the other. A knock off arrangement is incorporated at the discharge end of the heating units, which prevents heated billets from adhering to one another. The elevator at the loading end will accommodate sufficient billets to ensure continuous operation of the forging press for a period of 10 min. Two micro-switches are fitted, the first of which operates an alarm system when the loading of fresh billets on to the elevator becomes necessary to ensure continued working of the installation. Operation of the second switch causes the power supply to be interrupted. In consequence, the risk of overheating of billets in the coils is prevented, when the supply of fresh billets has been stopped.



Birlec dual-frequency billet heating equipment installed adjacent to a Massey forging press. Current at mains frequency is employed for pre-heating, and the billets then fall through a high-frequency coil

An 850-kW. dual-frequency billet heating installation of similar design has also been supplied recently by the company to Beans Industries, Ltd., Tipton, Staffs.

Sales of Birlec induction heating equipment are handled by Birlec-Efco (Melting), Ltd., Aldridge, Staffs.



Machining Operations on Honeycomb Structures

By R. G. KELLNER*

Honeycomb sandwich structures may be regarded as engineering material fabricated in sheet form, with physical properties which are particularly desirable in aircraft construction. Ideally, this material would be made in a single manufacturing process to the desired total thickness, with high-strength integral skins and an internal cellular structure somewhat resembling that of foam plastics or rubber. Moreover, the outer skin and cellular centre structure would be so well controlled that optimum stiffness-to-weight ratio would always be obtained.

The attractive strength-to-weight ratio of honeycomb sandwich structures is due to the location of the relatively dense, high-strength material in the extreme fibres where in flexure the unit stress is greatest. The low-density, weak material is in the core where the unit stress is least. Any aircraft not being propelled as a projectile is essentially a flying flexural member, and sandwich structures are therefore of great importance in this field.

If this material is to be used effectively, its composite physical properties must be recognized in order that structures may be confidently designed with the knowledge that they can be readily fabricated. The working of honeycomb structures presents many unusual problems because the thin (0·010 to 0·025 in. thick), tough skins are not well supported. Somewhat similar difficulties would be encountered, for example, if an attempt were made to drill a ½-in. diameter hole through a piece of 0·010-in. thick steel sheet, backed by a pad of sponge rubber; to machine 0·002-in. thick steel foil by ordinary shop techniques; or to clamp a piece of sponge rubber to a machine table without crushing it.

It is evident that support for the core must be provided if honeycomb material is to be machined, and that operations must be performed with little or no tool pressure. Any filler to be used as support material for the honeycomb core should be readily obtainable and inexpensive; be easily applied with little or no special equipment; be easily removed and suitable for re-use; and should provide adequate support during the machining operations.

Filler materials were used for mounting honey-

* Aircraft Gas Turbine Division, General Electric Co., U.S.A.

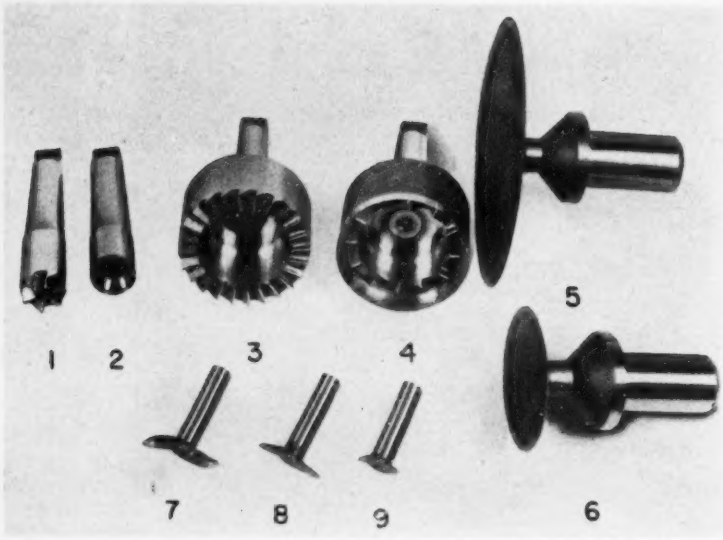


Fig. 1. Nine special cutters which were designed for use on honeycomb cores. Only No. 5 and 6 proved successful

comb cores during tests carried out by the General Electric Co. For this purpose, a 16-gauge, sheet-steel tray was employed, which measured approximately 1 in. larger on all sides than the part to be held, as seen in the heading illustration. The edges of the tray were about $\frac{5}{16}$ in. high and were bent inwards at an angle of 30 deg. Clamps were used to secure the tray, containing the mounting filler (in this case Cerrobend), and the work to an angle bracket on the machine table.

MACHINING WITH SPECIAL CUTTERS

During machining tests of honeycomb material, various special cutters were constructed, nine of which are shown in Fig. 1.

Cutters No. 1 and 3 were designed to cut out the facing sheet in the manner of an end-mill. During the test, the core collapsed, since it could not resist the pressure necessary for proper functioning of these two cutting tools. Cutters No. 2 and 4 were intended to follow No. 1 and 3, respectively, to remove the core of the sandwich structure. Although the knife-like, peripheral cutting edge sliced through the core material as planned, the internal end-mill portions of the cutters failed to remove those parts of the facing sheet left by the first two cutters.

Only cutters No. 5 and 6 proved to be satisfactory. Cutter No. 5 was made from 18-4-1 high-speed steel hardened to 58-62 Rockwell C. It is a mushroom-shaped tool, of 6 in. diameter, with an included knife-edge angle of 5 deg. and a dish angle also of 5 deg. Cutter No. 6 is of the same material, of 3 in. diameter, with an included knife-edge angle of 5 deg. and a dish angle of 10 deg.

Both these cutters performed well at speeds of 2,400 and 3,200 surface ft. per min. and good tool life was obtained with feed rates as high as 30 in. per min. Slices as thin as 0·025 in. were consistently cut, leaving the trimmed surface straight and the edges of the cells clean and practically free from burrs, as can be seen in Fig. 2. The machine set-up for this slicing

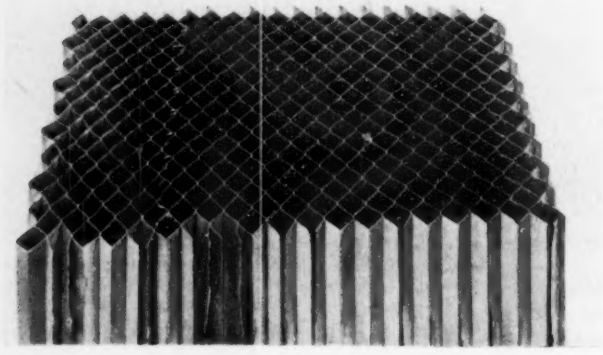


Fig. 2. The fragility of honeycomb core is evident from this test sample. A slice has been removed from the top surface with the No. 5 cutter in Fig. 1. The cut edges are straight and almost free from burrs

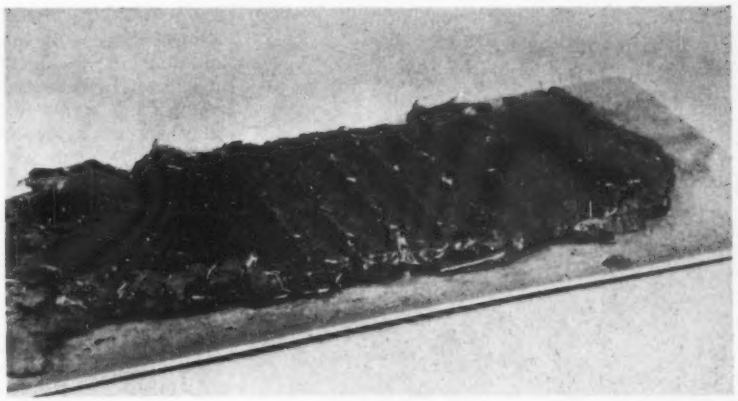


Fig. 3. After filling these core cells with a mixture of iron powder and sodium silicate, cuts were taken with a staggered-tooth side mill. Some break-out of the filler is evident

operation is shown in the heading illustration. It was found that the three fly-type cutters designated No. 7, 8 and 9 in Fig. 1 could not be used satisfactorily for cutting recesses or shoulders because, except that the cut is intermittent, they function in the same general way as the slicing cutters, No. 5 and 6.

MILLING TESTS ON HONEYCOMB CORE MATERIAL

Apart from tests involving the slicing of core material, milling of honeycomb has received considerable attention.

The honeycomb must be made rigid to withstand the action of a milling cutter. To this end, several core sections were filled with different materials to determine the merits of each. One operation was performed with a side-milling cutter, ¼ in. wide by 6 in. diameter, with 36 staggered teeth. The core was filled with a mixture of iron powder and sodium silicate. Climb-milling cuts were taken at speeds up to 150 r.p.m. and at feed rates of 1¼ to 6¾ in. per min. Results of this test can been in Fig. 3. The edges are fairly clean, but it is evident that some break-out of the filler occurred.

Another core section of the same general configuration was filled with a mixture of stainless-steel powder and sodium silicate. The same cutter was run at speeds of 130 to 500 r.p.m. with feed rates varying from 1¼ to 16 in. per min. and a ⅛-in. deep cut. All the cuts were satisfactory. As seen in Fig. 4, the edges of the honeycomb were clean, and there was no break-out of the filler.

Several other tests were carried out with different fillers. Among the less successful of these materials were certain epoxy resins. No combination of speeds and feeds proved satisfactory due to the brittleness of the fillers which invariably broke away from the core metal, and severe burrs were formed.

While using the same 6-in diameter, side-milling cutter, Shell Chemical Corporation epoxy No. 1007 was tried. It was found that this material, which has a higher melting point than those previously tried, was suitable from the machining standpoint. A ¾-in. diameter, 4-flute end-mill was used for another series of tests. The fillers employed were Shell epoxy No. 1001, 1004, and 1007; also Furane Plastics, Inc., Epocast H-883, and all were satisfactory. This method of producing slots in honey-

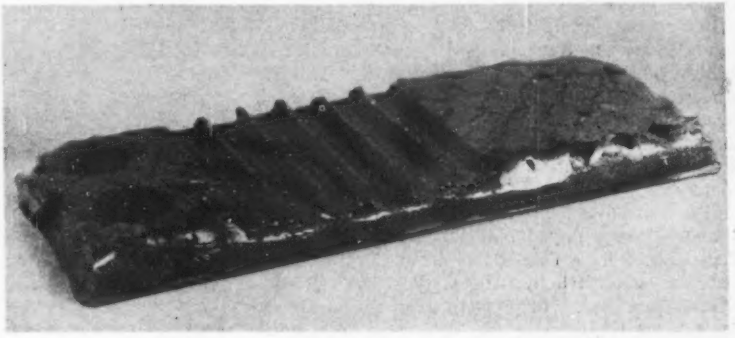


Fig. 4. For this honeycomb, the filler was stainless-steel powder and sodium silicate. Using the same cutter as for Fig. 3, at various speeds and feeds, noticeably improved milling cuts were obtained

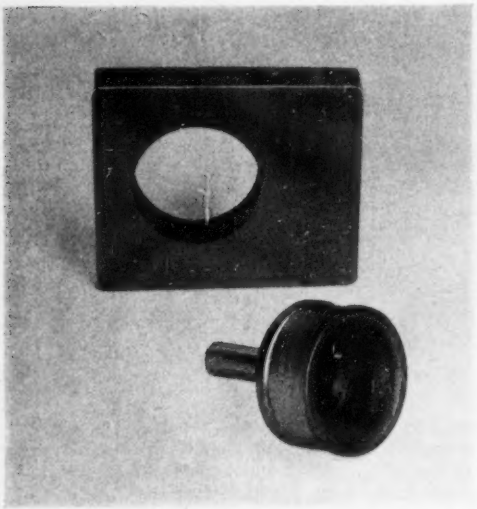


Fig. 5. This clean hole was made through a honeycomb sandwich by electrolytically-assisted grinding. Angular holes in the top surface of the metal-bonded cup wheel directed the electrolytic coolant to the cutting edge

comb cores was successful with a feed rate of 6¾ in. per min. and a speed of 56 r.p.m.

PRODUCING HOLES IN HONEYCOMB SANDWICHES

So far, grinding is the only method that has proved satisfactory for producing an accurate hole in a honeycomb sandwich structure. There is not enough inherent support to permit of drilling with either conventional or modified tools without the use of a filler. Drills with a point angle of 60 deg. standard and modified centre drills and flat-point (166-deg. negative angle) drills have been tried without success.

For each grinding test, a flat sample of honeycomb sandwich was clamped to a faceplate, or held in a chuck, and rotated. A cup-type grinding wheel, of a grit suitable for the work material, was rotated at a speed of 16,000 r.p.m. and fed into the sandwich. The centre line of the wheel was eccentrically located with respect to the hole centre.

It is also possible to produce holes by electrical-discharge machining, but the time required—more than 15 min. for a 1-in. diameter hole in ½-in. thick material—was such that the method was not considered practical. In special tests conducted at the Anocut Engineering Co., however, holes were successfully produced by the electrolytically-assisted grinding process. A wheel for this purpose and the hole obtained are shown in Fig. 5.

The test was carried out on a Delta drill press which had been modified to provide a speed of 2,000 surface ft. per min. for the 1½-in. diameter, metal-bonded cup wheel. Current was supplied to the spindle from an Anocut power unit by means of a slip ring and two motor car starter brushes. Plastics sheets placed beneath the work and the clamping bars effectively insulated them from the machine.

For this process, a special solution of non-corrosive electrolytic salts in water replaces the standard coolant. Material to be removed is stripped away by electrolytic action as current passes between the grinding wheel and the work. During the hole-grinding operation, the coolant stream was applied to the top of the cup wheel, in which angular holes had been drilled to direct the flow to the cutting edge.

Good quality holes were produced in time periods varying from 1½ to 2 min. Holes can be produced in cores with cell wall thicknesses of only 0·001 in. without forming burrs. Difficulty was at first experienced due to arcing at the top of the cup wheel, which was the same diameter as the cutting end. To eliminate this trouble, the diameter at the top was reduced.

Core material may be drilled by conventional methods if rigidity is imparted by the use of suitable fillers. Table 1 shows the results of tests made with a ½-in. diameter drill having a 118-deg. point angle and a 9-deg. lip-relief angle. A filler of Shell Epoxy 1001 was melted in an oven at a temperature of 300 deg. F. It was then removed from the oven and poured into the honeycomb, with the core resting on a flat plate. Filling progressed satisfactorily with no apparent formation of air pockets in the cells.

TABLE 1. DRILLING TESTS ON HONEYCOMB CORES FILLED WITH SHELL EPOXY NO. 1001

Drill speed, surface ft. per min.	Feed, in. per rev.	Hole size, in.	Remarks*
150	0·003	0·512	Resin melted and stuck to drill
50	0·003	0·505	Resin melted and stuck to drill
50	0·009	0·506	Slight melting
50	0·009	0·499	Slight melting
50	Hand	0·519	Heavy through feed—resin did not melt
80	Hand	0·517	Through feed with oil coolant—resin did not melt
80	0·012	0·505	Oil coolant—no melting
70	0·012	0·500	Water coolant—no melting

* All holes had burrs at the bottom due to brittle nature of resin Subsequent tests with Shell Epoxy No. 1007 eliminated this trouble.

TABLE 2. DRILLING TESTS ON HONEYCOMB CORES FILLED WITH SODIUM SILICATE AND METAL POWDER

Drill Speed, Surface ft. per min.	Feed, in. per rev.	Filler Metal	Remarks
150	0·003	Titanium ...	Excessive drill wear—honeycomb torn
75	0·003	Titanium ...	Slight reduction in drill wear—honeycomb torn
50	0·003	Titanium ...	Normal drill wear—tearing reduced
50	0·003	Stainless steel	Normal drill wear—clean hole
75	0·003	Stainless steel	Normal drill wear—clean hole
200	0·003	Aluminium	Normal drill wear—honeycomb torn
150	0·003	Aluminium	Normal drill wear—best hole in aluminium
50	0·003	Aluminium	Normal drill wear—honeycomb torn
75	0·003	Cast iron ...	Normal drill wear—clean hole
150	0·003	Cast iron ...	Normal drill wear—poor hole
50	0·003	Cast iron ...	Normal drill wear—clean hole, accurate size
150	0·003	Cast iron ...	Normal drill wear—clean hole, oversize

A second group of tests was made on a Buffalo drill press using a drill of the same form. For these tests, the honeycomb was bonded to an aluminium backing plate with an epoxy resin and was filled with a mixture of sodium silicate and powdered metal. Various metal powders were used, with the results indicated in Table 2.

SAWING HONEYCOMB STRUCTURES

Sawing tests on honeycomb sandwiches were carried out on a DoAll band saw with a maximum speed of 10,800 ft. per min. The work was hand-fed against a 24-pitch, $\frac{1}{32}$-in. thick blade running at speeds ranging from 350 to 6,000 ft. per min. Every cut left burrs which had to be removed by abrasive-belt grinding. The higher cutting speeds are recommended because they give the smallest burr and produce the cleanest cuts.

Honeycomb cores present a slightly different problem. It is not desirable to saw this material parallel to the axis of the core cells with a toothed blade because of the excessive tearing of the thin (0·002-in. thick) material. Such an operation would require substantial support for the cell walls.

Core material can be cut parallel to the axis of the cells if a knife-edge band is used and is operated at a minimum speed of 10,000 ft. per min. All types of knife-edge bands will operate satisfactorily, including single-bevel, double-bevel, wavy-edge, and scalloped-edge. The single-and double-bevel edges proved most satisfactory from the standpoint of cleanness of cut.

Band-sawing across the core—at right angles to the axes of the core cells—has not been particularly successful due, mainly, to the absence of a kerf when knife-edge blades are used. It is suggested that the core material should be fabricated to the required height rather than sliced to size with a band saw. Results of tests in which a single-bevel blade was used for cross-cutting core material are shown in Table 3.

After machining cores that have been temporarily filled, the material must be completely removed. Two methods were employed to remove epoxy resins and Cerrobend (the latter was used to mount the core material for slicing tests)—oven-heating and steam cleaning. In every instance, a thin film (epoxy resin) or a few globules (Cerrobend) remained on the ribbons.

Blasts of hot air at a pressure of 20 lb. per sq. in. and a temperature of 300 deg. F. failed to remove the film or the globules. The epoxy film, however, can be dissolved in methyl, ethyl, ketone, or acetone. It is recommended that Cerrobend be avoided, due to the contaminating effect of the the residual tin-lead alloy in subsequent brazing operations.

Iron-powder and sodium-silicate filler is the most easily removed. For this purpose, the part may be immersed in boiling water for approximately 30 min., or subjected to a water-steam jet for about 10 min. The iron powder can be salvaged and re-used.

CONCLUSIONS

1. On the basis of extensive tests, it can be stated that high-temperature honeycomb sandwich and core materials can best be machined by elec-

TABLE 3. BAND-SAWING TESTS ON HONEYCOMB CORES (AT RIGHT ANGLES TO THE CELL AXIS) WITH A SINGLE-BEVEL BLADE*

Saw speed, ft. per min.	Feed, in. per min.	Remarks
	LOOSE BLADE GUIDES	
4,320	Rapid	Crooked cut—straightened out when feed was reduced
5,400	6	Straight cut—small burr
5,400	6	Slight run-off
	TIGHT BLADE GUIDES	
6,120	8½	Straight cut—slight burr
7,560	15	Cut ran out
7,560	6	Cut ran out
10,800	1·2 to 6	Cut ran out—unsatisfactory

* Mist coolant (Johnson's wax with water—1 : 20) was used for all tests at the rate of 40 drops per min.

trolytically-assisted grinding with metal-bonded abrasive wheels.

2. Rough-cutting of the sandwich and core parallel to the core axis can be carried out on a band saw with commercially available blades, and at appropriate speeds and feeds.

3. Conventional shop equipment can be used to machine honeycomb cores if the cell walls are first supported by an adequate filler. This method is not recommended, however, because the filler must be removed, and incomplete removal may result in contamination during later brazing operations.

4. Where required, the core may be finished to height limits of ±0·001 in. by means of a special slicing tool, followed by electrolytically-assisted grinding.

New Michigan Spline-rolling Technique

New tooling which has been developed by the Michigan Tool Co., Detroit, Michigan, U.S.A., enables long splines or serrations to be rolled, on Roto-Flo machines, on solid shafts or tubular parts with comparatively thin walls, as shown in Fig. 1. It is stated that the dimension from the root of the spline to the bore of a tube may be as little as 0·075 in.

For the new method, cylindrical racks of the form shown in Fig. 2 are employed, the teeth being of the same height throughout. These racks are reciprocated over the work rapidly, with a fairly short stroke, and the force exerted is only of the order of 3,000 to 4,000 lb. As the racks reciprocate, the work is fed axially at the rate of $\frac{1}{16}$ to $\frac{1}{8}$ in. per sec. until splines of the required length have been rolled. Thin walled tubes may be mounted on mandrels for the rolling operation, to avoid risk of bore distortion.

The cylindrical racks, which are 8 to 10 in. long, are made from alloy steel. When a portion of the periphery becomes worn, a rack may be turned in its holder to present a fresh section to the work. To enable splines to be rolled fairly close to a shoulder, a rack may be employed which has a right-angle notch extending for the full length.

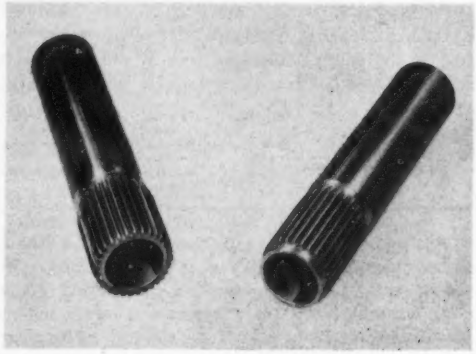


Fig. 1. Thin-walled parts on which splines have been rolled by a new Michigan technique

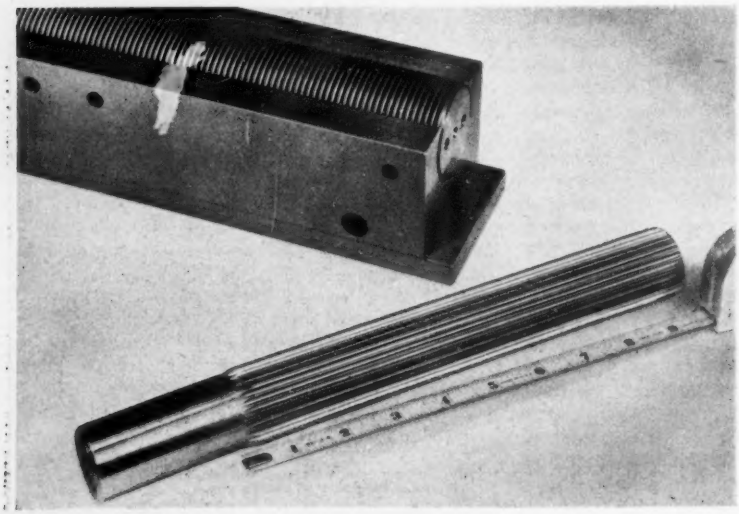


Fig. 2. The cylindrical rack employed for the new Michigan spline rolling process, and a shaft with long splines produced by rolling

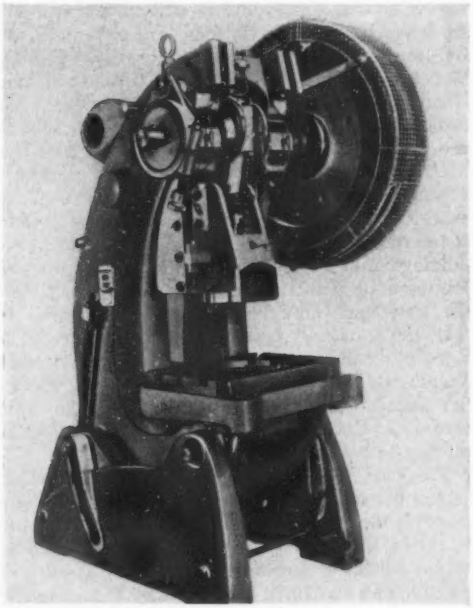
Gaston E. Marbaix, Ltd., Devonshire House, Vicarage Crescent, Battersea, London, S.W.11, represent the Michigan Tool Co. in this country.

New Production Equipment

Norton Industries 40-ton Inclinable Power Presses

Norton Industries, Ltd., Stafford House, Norfolk Street, Strand, London, W.C.2, have introduced a 40-ton inclinable power press which is available in both geared and ungeared types, the latter being shown in the accompanying illustration. Inclination of the cast-iron frame is effected by screw and nut, and there is provision for locking the adjustment in the 16, 26, and 36 deg. positions. Steel tie bars, which can readily be removed, are incorporated.

Drive from the motor to the flywheel is transmitted by V-belts, and phosphor-bronze shaft bearings of large proportions are fitted throughout. On the ungeared press, the ram speed is 100 strokes per min., and the stroke is adjustable in eight increments, from 1½ to 4½ in., through the medium of a phosphor bronze eccentric on the crankpin. The geared press runs at 50 strokes per min. and the stroke is adjustable from ¾ to 3¾ in. The high-duty cast-iron ram moves in adjustable V-guides, and height adjustment is effected by a ratchet mechanism. A maximum daylight of 13 in. is provided, and the minimum distance from ram to bolster, with stroke and adjustment down, is 5 in. An adjustable top ejector is incorporated. The bolster measures 27 by 20 in., and has an 11½ in. diameter hole fitted with a removable ring of 6-in. bore.



Norton Industries 40-ton inclinable press

An improved clutch has been specially developed which incorporates a solid key of chrome-vanadium forged steel, hinged in a knuckle joint formed in the clutch hub keyed to the crankshaft. The key engages a forged steel driving ring spigoted in the flywheel. When engaged, the key is in direct compression only, and it is stated that, apart from lubrication, the clutch requires no attention. Control of the press is by foot lever, and a selector can be set for single-stroke or continuous running.

Automatic lubrication is normally provided by a Tecalemit Bijur high-pressure system, but alternative systems can be fitted to suit customer's requirements. Additional equipment which can be incorporated includes Udal interlocked or other types of guards, a ram balance cylinder, a cushion cylinder, a pneumatic control for the clutch, and a stroke counter.

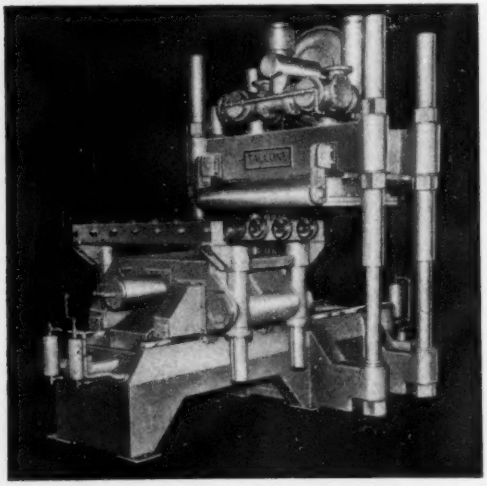
Baker Perkins Taccone Diaform Diaphragm Moulding Machine

The Foundry Plant Division of Baker Perkins, Ltd., Hebburn on Tyne, Co. Durham, has recently introduced the Taccone Diaform diaphragm-type moulding machine, as shown in the accompanying illustration. These machines are made in a range of sizes to accommodate moulding boxes from 12 by 18 in. to 35 by 96 in., and special sizes can also be supplied. Built under licence from the U.S.A., the machine incorporates a flexible rubber diaphragm for applying the pressure required to

consolidate the sand round the pattern projections, and it is claimed that this system offers several important advantages. In particular, the pressure applied to the sand is approximately equal at all positions, and the density of the resulting mould is therefore uniform. The high pressures exerted on the sand, which may be of the order of 80 lb. per sq. in., depending on the hardness required, result in a reduction of its original volume by about one-third, and it is stated that the mould is harder than those obtainable on conventional jolt-squeeze machines.

The use of the rubber diaphragm results in the outer surface of the mould taking up roughly the same contours as the pattern plate, and the process is sometimes termed contour moulding. An accurate reproduction of the pattern shape is obtained, and castings can be made to close tolerances. Air which is squeezed out from the sand, and from the space beneath the diaphragm, escapes at the pattern face, and it is believed that good venting of the mould is thus ensured.

A squeeze head, supported on posts at each corner, carries the diaphragm and the necessary air pressure control equipment, the diaphragm being held up clear of the moving parts of the machine by vacuum when it is not in use. The diaphragm is not subjected to excessive stress and will usually suffice for some 70,000 moulds before replacement is necessary. A substantial base, which carries the four posts, is extended beyond the head at one side. On this base there are ways for a wheeled carriage, which is moved by a long-stroke horizontal air cylinder. Mounted on this carriage is the stripping unit, which is also powered by an air cylinder, and above it, the pattern plate.



Baker Perkins Taccone Diaform diaphragm moulding machine

With the normal installation, the sand supply is taken from a metering hopper, fed from a conveyor band, and as the pattern plate, fitted with a moulding box and an additional frame to retain the excess sand, is moved towards the squeeze head, the sand is released. The arrangement is such that the sand is evenly distributed in the box and is ready for squeezing without further treatment. As soon as the carriage has moved the mould into position beneath the head, air pressure is applied above the diaphragm and the mould is consolidated in about 2 sec. Suction is then exerted to retract the diaphragm, and the carriage is moved outwards to the stripping position, and the mould removed. A normal moulding cycle occupies between 15 and 20 sec., according to the efficiency of the handling system employed for the moulds, so that high rates of production can be maintained.

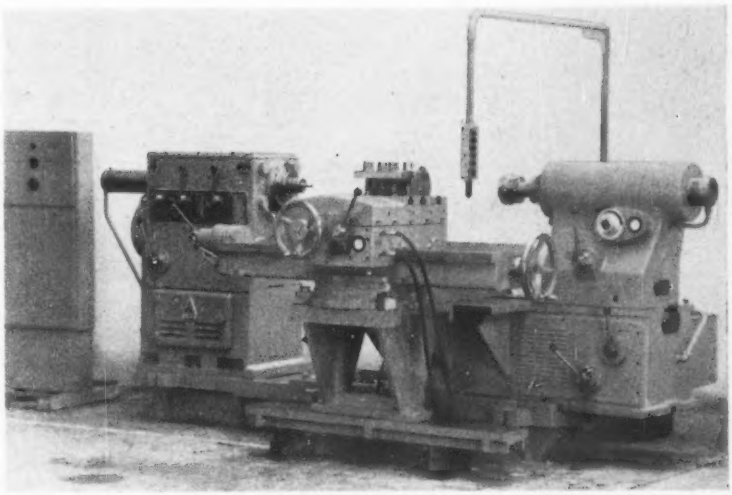
Leifeld Type Plb 1200 Hydraulic Spinning Lathe

The type Plb 1200 hydraulic spinning lathe, shown in the figure, has recently been added to the range built by the German firm of Leifeld, who are represented in this country by Embassy Machine & Tool Co., Ltd., 248 Watford Way, Hendon, London, N.W.4.

The 48-in. centre, all-geared, headstock, and the bed, are mounted on a well-ribbed cast iron base, which is normally sunk, for the greater part of its depth, in a pit in the shop floor. Drive to the headstock is taken from a 25-h.p. motor mounted at the rear, through V-belts, and 18 spindle speeds, ranging from 5 to 625 r.p.m., are provided. Mounted in parallel and taper roller bearings at the nose end, and a plain roller bearing at the rear, the spindle is bored to take a pusher rod for a hydraulically-operated ejector mechanism which facilitates the removal of formed workpieces from the chuck. The spindle nose has a quick-acting cam lock flange, and a short, tapered, locating portion to receive the spinning chucks.

Provision is made for moving the bed, which carries the tailstock and saddle, in adjustable guideways on the base by means of a hydraulic cylinder, either for performing the actual spinning operation, or for adjusting the length of the gap from 16 to 54 in. This motion is controlled by a conveniently placed lever, and movement of a second lever operates a hydraulic clamping arrangement

whereby the bed is secured to the base. If required, bases can be supplied which enable gap lengths of 74 and 94 in. to be obtained. The tailstock barrel has a maximum stroke of 30 in., and variable clamping forces from 0 to 5 tons can be applied to the work hydraulically, a control valve and pressure gauge being mounted on the front of the body. A freely-rotating end piece on the barrel, to which back-up plates can be bolted, runs in taper roller bearings. The body is traversed on the bedways by rack and pinion, and, if required, cross-adjustment can be provided, to enable certain operations, such as necking, to be performed on the work.



Leifeld type Plb 1200 hydraulic spinning lathe

A support bracket for the saddle, which slides on a separate base, can be attached to the front of the bed, as shown. The saddle can be turned through a full circle on the swivel base, which is secured either to the bed or the support bracket by four clamps. T-slots for the clamping bolts extend lengthwise in the top surface of the bed and crosswise in the support bracket, to enable the saddle to be mounted in various positions.

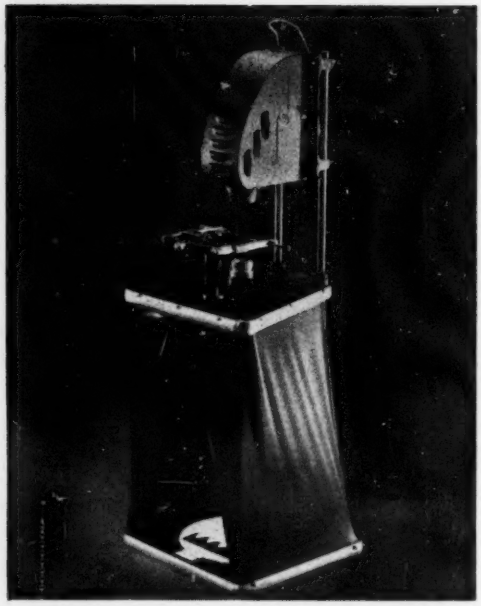
The compound slide, which carries the spinning roller, is traversed on inverted vee and flat guideways by a hydraulic motor mounted at the headstock end of the saddle, through 2-speed reduction gearing and a screw and nut. Adjustment of the steplessly-variable spinning feeds, and reversal of the slide, are obtained by means of a lever on the motor housing, and rapid power traverse is engaged by a second lever. The cross-slide may be moved either by a handwheel, through a screw and nut, or by a hydraulic cylinder, and an interlocking arrangement is incorporated to prevent simultaneous engagement. For stepless variation of the contact pressure between the spinning roller and the work, there is a control valve on the cross slide, and a hydraulic pressure gauge is fitted to facilitate setting. The hydraulic cross slide permits of spinning certain non-circular shapes without the need for special equipment, and, if required, a template-controlled copying system can be provided.

Mounted on the rear of the bed, the hydraulic unit incorporates a 3-stage pump driven by a flange-mounted motor. Pressure oil is delivered to the hydraulic motor through passages formed in the swivel base and the saddle, and with this arrangement the amount of piping at the front of the machine has been reduced. If required, the push-buttons for controlling the electric motors can be mounted on a swivel pendant unit, as shown.

Prototype Developments Optical Projector

The bench-type optical projector shown in the accompanying illustration has recently been introduced by Prototype Developments, Ltd., Arundel Road, Luton, Beds., for viewing threaded and other components up to 3 in. diameter. Work is held between two horizontally opposed centres, one of which is spring loaded and the other locked by a retaining screw. If required, a micrometer may be fitted in place of the fixed centre to facilitate accurate positioning of the work with reference to a thread form or other pattern outlined on the viewing table. Fixtures of special design may also be used for holding the work, in place of the centres normally provided.

The head in which the centres are held has vertical and lateral adjustments, to enable the work to be correctly positioned in the light path. In addition, the head can be inclined for viewing a thread at the helix angle, and turned horizontally



Bench-type optical projector made by Prototype Developments, Ltd.

through 360 deg. This latter movement enables the work to be loaded at the front, and then swung into position between the light source and the lens, as shown in the illustration. Illumination is provided by a 12-volt, 100-watt, projection lamp, which, together with a double condenser and a continuously-rated mains transformer, is contained in a ventilated housing, secured by sliding clamps to two tubular guides.

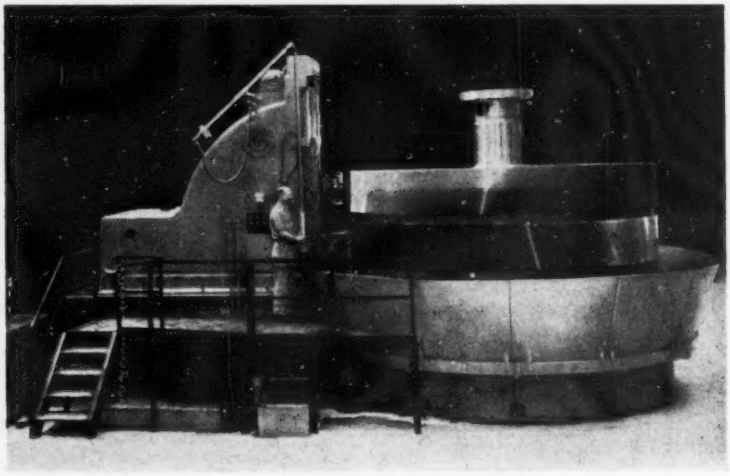
Two fixed-focus lenses, providing magnifications of 10 and 20 × are normally supplied, but lenses of higher power are available on request. The image is displayed on a rotatable plastics-faced viewing table, on which drawings can be made in pencil, and removed at will. Daylight viewing is permitted by a curtain which prevents extraneous light from falling on the viewing table. The equipment is 37 in. high, and has a 13-in. square base.

Large Michigan Gear Shaver

The type V.200 gear shaver, here shown, has recently been built by the Michigan Tool Co., Detroit, Michigan, U.S.A., and is installed at the West Lynn, Mass., plant of the General Electric Co., for finishing reduction gears for marine turbine drives.

Stated to be the largest of its type yet built, the machine has a capacity for shaving gears up to 200 in. diameter with face widths up to 74in., which may have integral shafts up to 40¾ in. diameter. It will handle internal and external spur, helical, and double-helical gears. The 178-in. diameter table will support gears with weights up to 67 tons, with fixtures weighing up to 22¾ tons, and rotates on a variable-pressure oil film with an accuracy, it is claimed, within 0·0002 in. for concentricity, and run out in the plane of the working surface. Steplessly-variable table speeds ranging from 0·93 to 15·16 r.p.m. are provided by a d.c. driving motor.

There are two shaving heads, which can be adjusted independently for angle, and will take cutters from 7 to 12 in. diameter, with 2½-in. bores, and face widths up to 3 in. The upper shaving head is adjustable for height. For the shaving operation, the cutter spindles are set at an angle



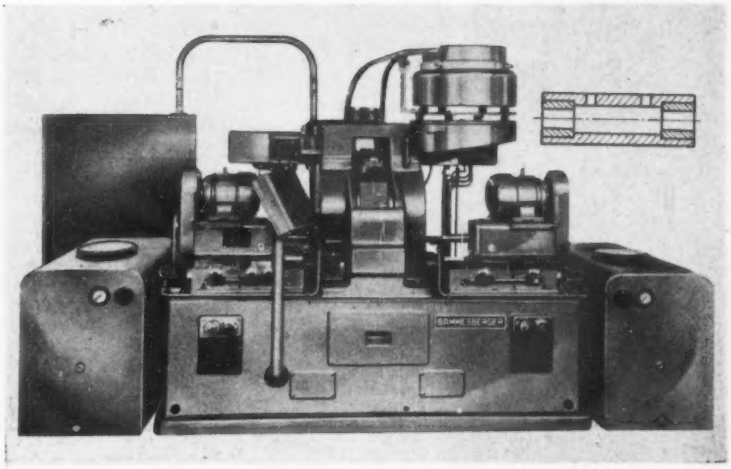
Michigan type V.200 shaver for large marine reduction gears (reproduced by courtesy of The General Electric Co., U.S.A.)

to the axis of the gear, and the saddle which carries the heads is reciprocated slowly on the column ways. Since two cutter heads are employed, comparatively short cycle times are obtained, and both ends of double helical gears are shaved simultaneously. Swarf is removed by means of a magnetic-type conveyor.

Provision is made for mounting inspection equipment on the machine, so that the work can be checked without the need for removing it from the table.

Weighing approximately 76 tons, the machine has an overall height of 14 ft. 2 in., and occupies a floor space of 36 ft. 7 in. by 19 ft. 3 in.

Gaston E. Marbaix, Ltd., Devonshire House, Vicarage Crescent, London, S.W.11, are the agents in this country for the Michigan Tool Co.



Bammesberger 5-station trunnion-type special-purpose machine for operations on pedal shafts

Bammesberger Special-purpose Machines

The German firm of Bammesberger, who are represented in this country by Mortimer Engineering Co., 202-206 Acton Lane, London, N.W. 10, build a variety of special-purpose machine tools incorporating their standard electro-hydraulic unit heads and slides. A representative example, of the 5-station trunnion-type, seen in the illustration, performs both machining and assembling operations on pedal shafts, one of which is shown inset.

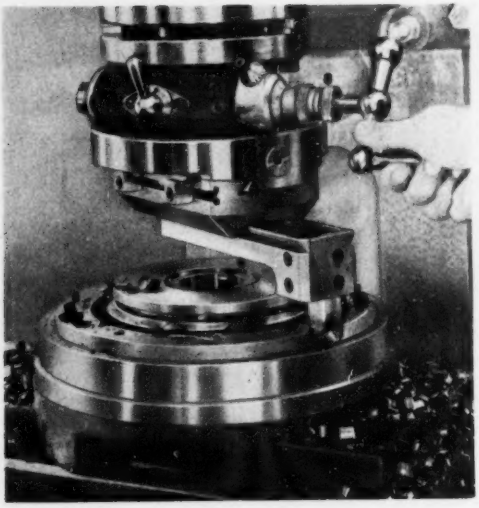
Blanks cut from drawn-steel tubing are first rough- and finish bored at each end. Next, two oil holes are drilled at right angles to the axis and deburred, and, finally, bushes from a vibratory feeder are pressed into the counterbored ends. When the machine is operated at 80 per cent efficiency, the pedal shafts are produced at the rate of 130 per hour. For the first two operations, two type BS 16 single-spindle drilling heads, of $\frac{18}{32}$-in. diameter capacity in steel, and two type DS 16 single-spindle precision boring heads, are employed. The latter have built-in equipment for controlling the operating cycle and for stepless adjustment of the feed rate. A type KS 16 standard slide unit with a 2-spindle drilling head, a de-burring unit, and two cylinders for inserting the bushes, are also provided.

Included in the range of Bammesberger heads is a single-spindle tapping unit, designated type GW 33, which has positive pitch control by lead-screw and nut. There is also a slide-mounted type SG 80 head which is designed for performing turning and countersinking operations on relatively large parts. This unit can be supplied with a facing head and a built-in cylinder to provide the transverse movements.

Machines can be supplied for fully-automatic operation with either hydraulic or mechanical work clamping, or with hand-operated loading, clamping, and unloading arrangements. Among special-purpose equipment recently built may be mentioned a rotary indexing machine for facing, drilling, milling, reaming, and tapping windscreen-wiper parts; a 2-way machine for facing wedge-type slide valves; a 5-station rotary machine for producing eye-bolts; a 2-way, 3-station, transfer machine for operations on both sides of cast aluminium gear casings; boring and facing machines for rear axle housings; and a 16-spindle drilling machine of single-way horizontal design.

D'Andrea Boring and Facing Head

Herbert Widdowson & Sons, Ltd., Canal Street Works, Nottingham, are the sole distributors in this country for the Italian-made D'Andrea boring and facing head shown in the figure.



D'Andrea boring and facing head

A noteworthy feature of the design is that radial feed can be applied to the facing slide either by hand or automatically, and may be started and stopped, as required, while the spindle of the associated machine is running. The head is available in three sizes, with radial movements of the facing slides of 1¼, 1¾ and 2¾ in., and capacities for facing workpieces of 8, 12 and 16 in. maximum diameter. Different sizes of Morse and non-sticking taper shanks can be supplied for the attachment of the heads to the cutter spindles of drilling, milling and boring machines, for example.

The centrally-disposed housing for the feed gears is attached, by means of screws, to a ring secured to the spindle head on the machine, so that it is prevented from rotating with the body which carries the facing slide. Power radial feeds at the rates of 0·0025 and 0·0075 in. per revolution are provided, motion being transmitted to the facing slide by separate sets of differential gears, mounted, in tandem, concentric with the body, thence through a safety clutch and a precision-ground screw.

Selection of feeds is made by a lever on the side of the housing, and adjustable dogs are provided for automatically stopping the radial movement of the slide.

A spindle extending from the housing carries a crank for hand radial adjustment of the slide, and is fitted with a dial which is calibrated to read directly in increments of 0·0005-in. on diameter. A second dial indicates the slide movements in increments of 0·05-in. on diameter. The slide incorporates a quick-acting clamping arrangement to facilitate changing cutting tools.

Digimatic Automatic-positioning Worktable and Control System

Electronic Control Systems, Inc., Los Angeles, California, U.S.A., a subsidiary of General Dynamics Corporation, have developed a worktable and automatic control system for use in conjunction with a drilling machine, for example. The complete set of equipment, which is known as the Digimatic model C-202 point positioner, comprises three main elements, namely, a punched tape preparation unit, shown in Fig. 1, a combined tape-reader and control console, and a worktable as seen in Fig. 2.

By means of the tape preparation unit, a punched tape is produced directly from the information on the working drawing. The tape is then transferred to the tape reader/control console, from which the information on the tape is automatically transmitted to the worktable. Motion is imparted to the table in accordance with the

Fig. 1. The punched-tape preparation unit for the Digimatic Type C-202 Point Positioner

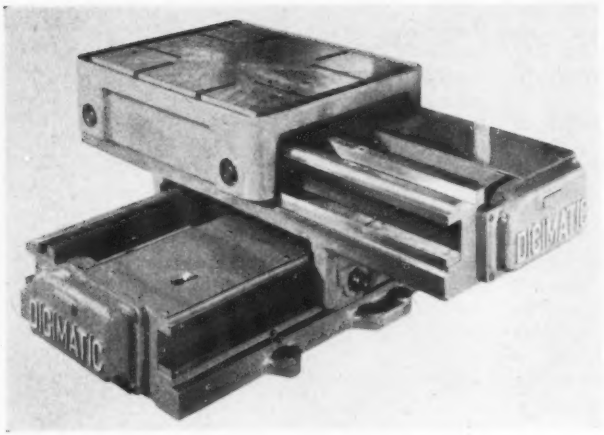


Fig. 2. The worktable of the Digimatic Type C-202 Point Positioner, which is used in conjunction with a punched-tape preparation unit and a combined tape-reader and control console

punched information, and, in consequence, the work is located in the required position beneath the drill point.

The electronic circuit operates on a closed servo-loop system, whereby the table position is automatically checked to ensure accurate location. It is stated that the speed of movement of the table slides, combined with the ease with which the tape can be prepared from a drawing and the elimination of non-productive time, enables one drilling machine equipped with this system to undertake work that would require approximately five conventional machines.

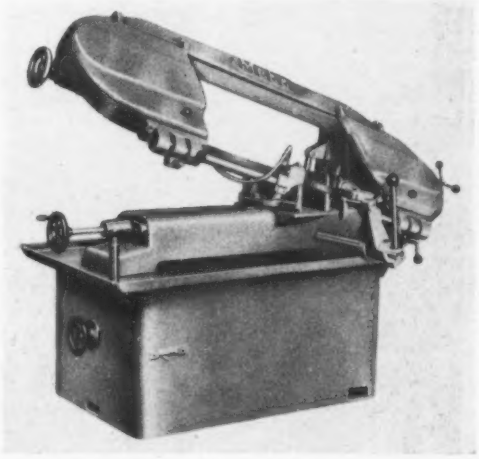
The table can be positioned to within 0·001 in. of a required setting, and can be adapted for use on machines for such operations as spot-welding, riveting, engraving, tapping, countersinking, and template plotting. Nine auxiliary operations can be catered for by the system, to include such functions as magnetic clamping and unclamping, and coolant flow control, for example.

Startrite-Meba Horizontal Bandsawing Machine

Under a reciprocal agreement between the Startrite Machine Tool Co., Ltd., Bishops House, Gads Hill, Gillingham, Kent, and Meba Maschinenbau, Esslingen, vertical bandsawing machines made by the former, and horizontal machines made by the latter, are to be marketed in both countries under the name Startrite-Meba, and certain parts will be produced under licence in both works.

Designed for repetition cutting-off operations on a variety of ferrous and non-ferrous materials, the German-built machine, here illustrated, is available with capacities for cutting bars up to 10 and 12¾ in. diameter, or 10 by 16¾ and 12¾ by 17½ in. cross-section. The moving vice jaw is initially adjusted by a hand-wheel and screw, and pressure can then be quickly applied, and released between successive cuts, by a lever and cam arrangement, from either side of the machine. Operation of the clamping lever also causes the adjustable work stop to be swung clear to prevent subsequent wedging of the severed piece, and when the lever is released, the stop is automatically returned. The vice jaws can be swivelled through angles up to 45 deg., for mitre cutting.

Drive is taken from a motor of ¾ or 1·1 h.p., depending on the size of the machine, through a taper pulley mounted on the rotor shaft. The pulley engages a point on the internally-tapered surface of a ring of friction material, which is secured to the input shaft of a totally-enclosed constant-speed gearbox. Axial adjustment of the motor along a slideway, by means of a hand wheel, with reference to a scale, causes the radius at the point of contact between the pulley and the ring to be altered, with the result that stepless variation of the speed of the cutting



Startrite-Meba horizontal bandsawing machine

saw, from 46 to 230 ft. per min., is obtained. The gearbox is arranged to pivot about the output shaft so that pressure between the pulley and the ring is maintained at different settings of the motor slide.

A 1-in. endless saw blade, with a length of 150 in., produces a cut 0·042 in. wide, and the adjustably-balanced saw frame is moved towards the work under rapid traverse, before a controlled, steplessly-variable feed is engaged. During cutting, coolant is delivered from a built-in tank in the base by a pump driven from the main motor, and the latter is automatically stopped at the end of the cut. Changing of blades is facilitated by the provision of swivelling guides. It is stated that cuts can be made with a maximum run-out of 0·005 in. from the vertical plane, and that 28-ton mild steel, for instance, can be cut at the rate of 4 sq. in. per min.

Equipment available includes an adjustable work-stand; vice jaws for bundle cutting; castors to enable the machine to be readily moved on the shop floor; and a butt-welding unit incorporating a blade shear, annealing facilities, and a motor-driven grinding head.

Brown & Ward Automatic Bar Feed Unit

An automatic bar feed unit recently introduced by Brown & Ward (Tools), Ltd., Hatherton Lane, Walsall, Staffs., has been developed from the prototype, semi-automatic, equipment which was described in MACHINERY, 89/353-10/8/56.

Available for use on most types of automatic screw machines, the latest unit has provision for automatically feeding fresh bar stock through the collet, which is then closed, and the end of the bar is parted-off square with the periphery. Since these motions form part of the fully-automatic working cycle, the machine can be operated continuously.

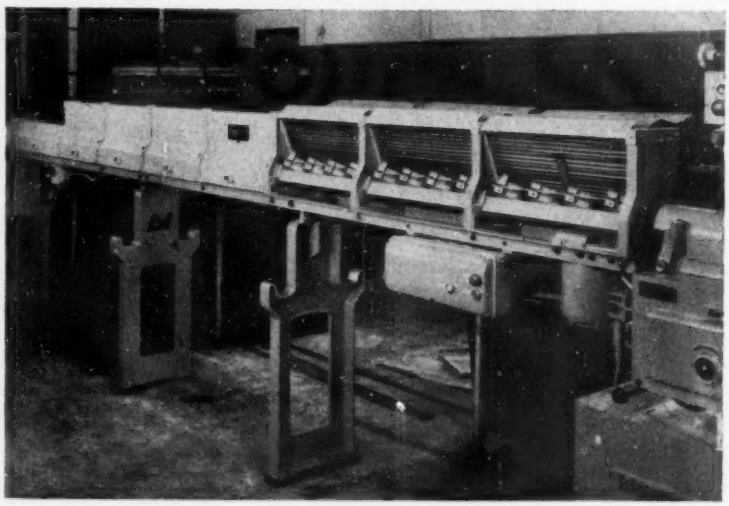


Fig. 1. The latest Brown & Ward automatic bar feed unit is here shown with some of the covers swung clear

Fig. 1 shows a view of the unit with some of the covers swung clear, and fresh bar stock may be seen on the inclined magazine chute, ready for loading into the feed tube. Eighteen ⅝-in. diameter bars, or 65 ¼-in. diameter bars can be accommodated on the chute, and the unit can be supplied to take lengths of 10 or 12 ft. Support columns for the feed unit have provision for storing additional bars, which are loaded, as required, through an opening at the top of the chute.

As with the previous unit, the bar in the feed tube is moved axially into contact with the turret- or swing-stop, at the end of each working cycle of the machine, by the action of a pusher arm coupled to an endless chain which passes round free-wheel sprockets at the ends of the unit. Drive to the sprockets is taken from an electric motor through a clutch which slips during the operating cycle, and can be adjusted to suit the diameter of the bar stock.

When the remaining length of bar is insufficient for the production of another workpiece, it is automatically ejected through the collet, and a second electric motor is started to return the pusher arm rapidly to the left-hand end of the unit. At the same time, a solenoid on the headstock is operated, with the result that the auxiliary stop *A*, Fig. 2, is swung downwards in front of the collet. In this close-up view of the tooling area on a Brown & Ward type 575 automatic, the usual swing stop *B* is shown in its working position for controlling the bar feed in preparation for the production of a component.

When the pusher arm has been returned to its left-hand position, the leading bar on the chute

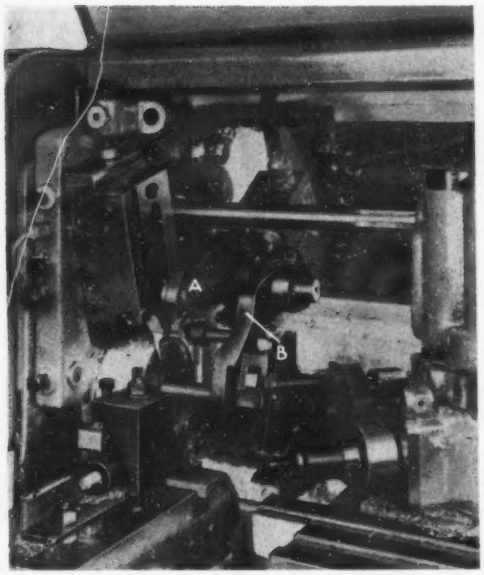


Fig. 2. Close-up view of the Brown & Ward type 575 automatic, showing the auxiliary swing stop used in conjunction with the bar feed unit

falls into the feed tube, and stops are swung into position beneath the next bar. Because the pusher arm is attached to an endless chain, reversal is obtained by a virtually continuous movement, and at the beginning of the feed stroke the rapid traverse motor is stopped. The bar is now moved into contact with the stop A by the action of the feed motor, and the collet is closed. Next, the stop A is swung clear, and the end of the bar is faced by the parting-off slide. Subsequent feed movements are imparted to the bar in the usual way at the end of each working cycle of the machine. The time required for loading a fresh 10-ft. long bar is 4 sec.

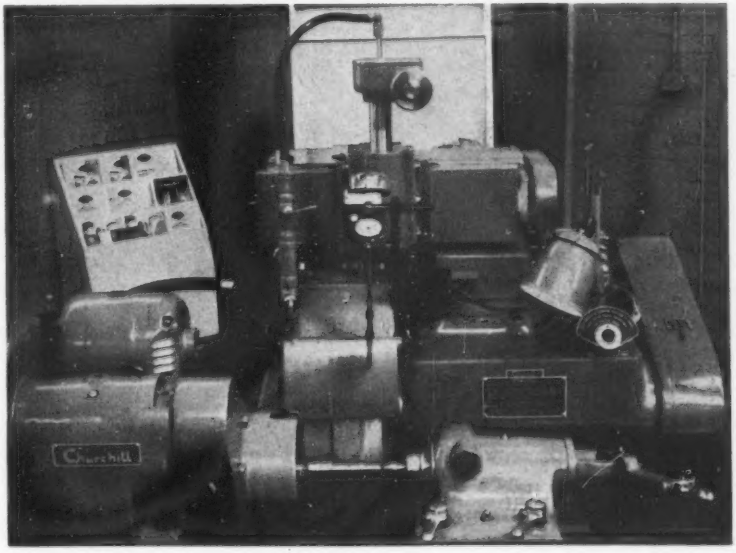
New Wheel Dresser for Churchill Type BW Plain Grinder

A new wheelhead-mounted dressing unit has recently been made available for the type BW 10-by 36-in. plain grinder built by the Churchill Machine Tool Co., Ltd., Broadheath, Manchester, and a close-up view of the machine fitted with this equipment is given in the figure.

With the new unit, profile shapes can be formed on grinding wheels up to 6 in. wide, and steplessly-variable traversing speeds of the dressing slide are obtained by means of a screw driven by a small electric motor, which is interlocked with the workhead driving motor. Vertical movement of a spring-loaded plunger, which carries the diamond holder, is controlled by a template during the dressing cycle, and adjustments for applying a fresh cut to the wheel at the completion of each pass are made in increments of 0·0001 in. by a knob-operated "click" feed mechanism.

The machine illustrated, which, as reported in MACHINERY, 93/853—8/10/58, was demonstrated recently at the showrooms of the sole agents, Charles Churchill & Co., Ltd., Coventry Road, Birmingham, is also fitted with the M.P.J. electro-sizing gauge for automatically controlling the infeed movement of the hydraulically-operated wheelhead.

(below) Close-up view of the Churchill type BW plain grinder fitted with a new wheelhead-mounted dressing unit



Set-up on a Conomatic for Producing Wedge Gate Valve Seats

The Cone Automatic Machine Company, Ltd., Aldridge, Staffs., have recently supplied to a well-known firm in this country a British-built 1⅝-in.-6 Conomatic, as shown in Fig. 1, specially equipped for producing valve seats from stainless steel bar, in a cycle time of 38 sec. Intended for use in a wedge gate valve, the seat has an angular front face, as seen in the drawing Fig. 5, which also shows the sequence of operations.

Features of the set-up include the provision of an angular facing attachment at position No. 5, and a scribing tool at position No. 6. High-speed steel tools are used throughout, and the spindle speed of 208 r.p.m. provides a surface speed of 73 ft. per min. At position No. 1, centring with a 1¼-in. diameter drill, and knee turning to 1¼ in. diameter are carried out from the end-working tool slide, and the 1·156 in. diameter is rough formed from the cross-slide. The centre hole is rough drilled part way, the 1 5/8-in. diameter is turned with a knee tool, and the 1¼-in. diameter is finish formed from the cross slide at position No. 2.

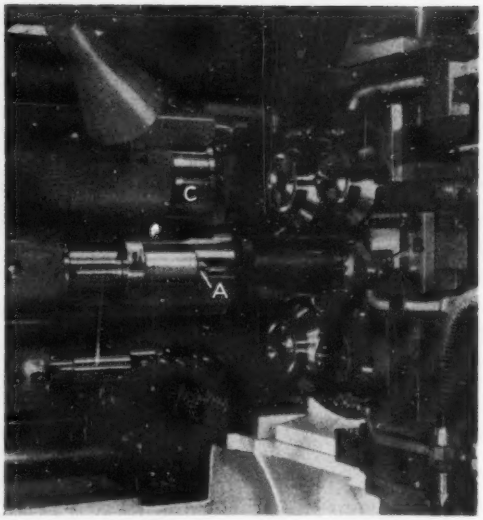


Fig. 2. Close-up rear view of the Conomatic, showing the angular facing attachment

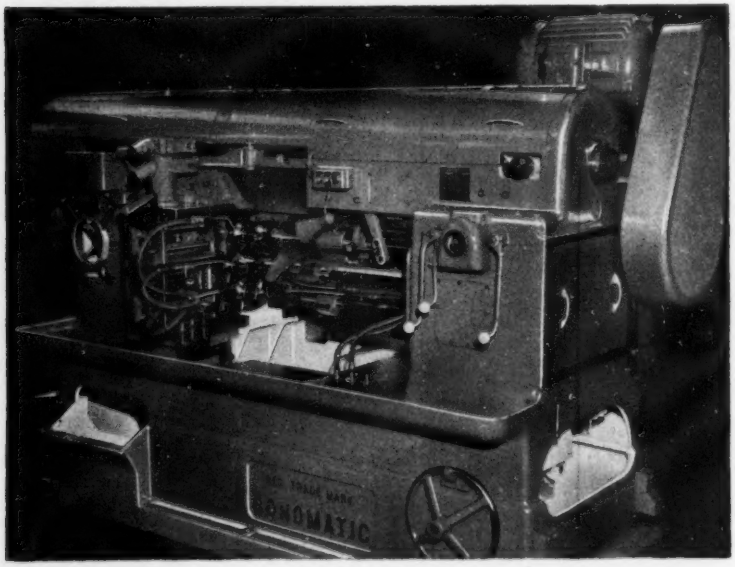


Fig. 1. This 1⅝-in.-6 Conomatic was demonstrated at the Milan Machine Tool Exhibition, set up for producing stainless-steel valve seats

Drilling to depth is completed at the third position, and a cross-slide form tool is applied to finish the 1·312- and 1·156-in. diameters. A spade tool, held in an auxiliary spindle on the end-working slide, is employed at position No. 4 to finish the 1-in. diameter bore, and the face at the collet side of the 1·312-in. diameter is finished, to produce the 0·343-in. dimension by means of a relieving

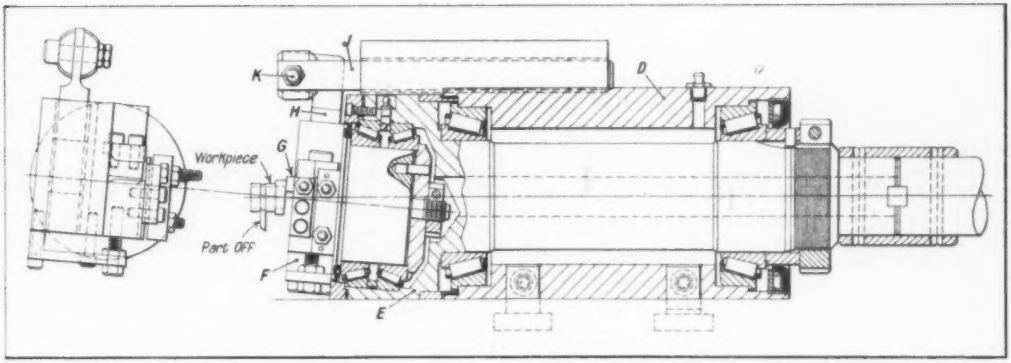


Fig. 3. Part-sectional view showing the design of the angular facing head

facing attachment mounted on the cross-slide. In the close-up rear view of the machine given in Fig. 2, the spade tool is seen at *A*, and the facing tool slide at *B*.

Angular facing, to 5 deg., at position No. 5, is performed with an end-working attachment *C*, specially developed for the purpose. A drawing of this attachment is given in Fig. 3, and it is seen removed from the machine in Fig. 4. The attachment housing *D*, mounted on the end-working tool slide, carries a central shaft running in opposed Timken taper roller bearings. This shaft

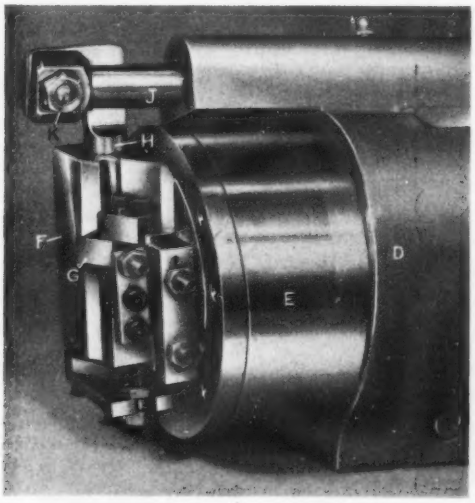


Fig. 4. Close-up view of the angular facing attachment removed from the machine

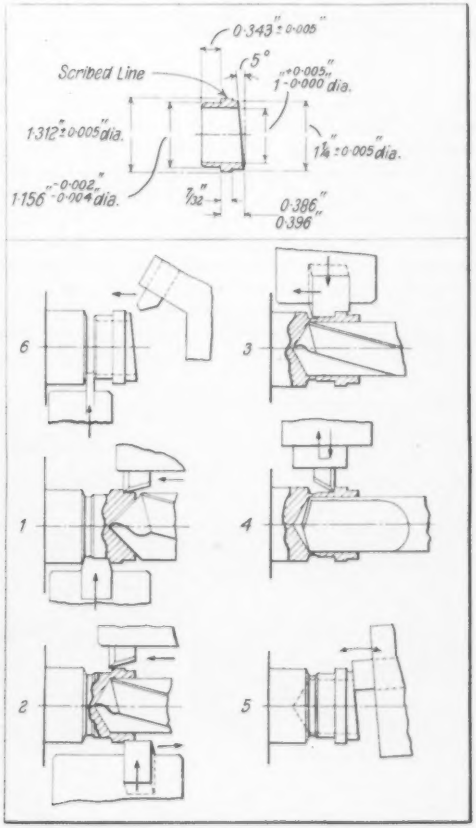


Fig. 5. The tool layout employed for producing the valve seat shown above

is driven from the end column of the machine in synchronism with the work spindles. The enlarged-diameter head *E* of this shaft is recessed at the front end to an angle of 5 deg. with the axis of the attachment, and in this recess the shank of a tool-block *F* is supported on Timken opposed taper roller bearings.

The tool block, which carries a tool-bit at *G*, is prevented from rotating by two round guide rods *H* and *J*, which are free to slide axially and are connected by a pivot at *K*. As may be seen, the bar *H* is accommodated in the slotted end of the bar *J*. Rotation of the headed shaft *E* thus causes the facing tool to follow an arcuate path, and the 5 deg. angular face is produced on the component. The centre about which the tool rocks, it will be noted, is the point of intersection between the axes of the headed shaft *E* and the tool-block shank.

An identification mark must be scribed on the 1·312-in. diameter, in line with the "low" point of the 5 deg. taper, to indicate the exact assembly position for the valve seat in the body. This line is scribed, at position No. 6, by means of a tool mounted in a rotating attachment on the end-working slide, which is driven at the same speed, and in the same direction as the work spindle. Parting-off is carried out from the cross-slide at this position, and the bar is then fed out to a stop, ready for the next cycle.

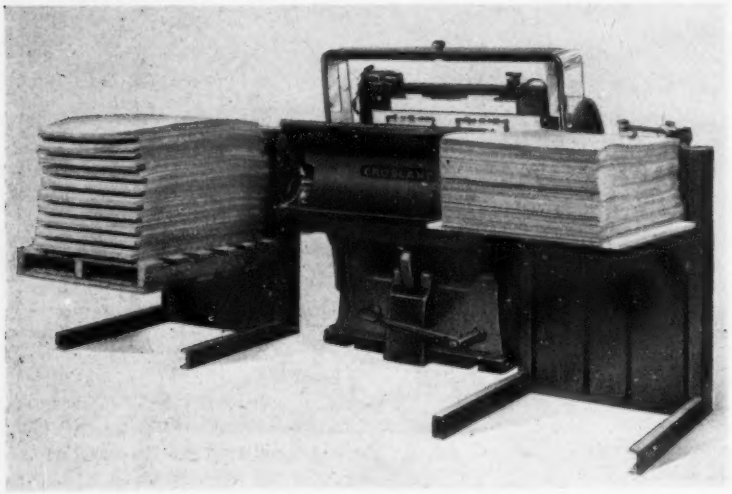
This 1¾-in.-6 Conomatic was demonstrated at the recent Milan Machine Tool Exhibition, and it is of interest to note that the machine was delivered direct, by road vehicle, from the makers' works to the Exhibition, by British Road Services.

Crosland Work Tables with Automatic Adjustment for Height

Work tables with automatic adjustment for height have recently been placed on the market by William Crosland, Ltd., Bredbury, near Stockport, Cheshire, to facilitate the handling of sheet materials.

These tables are intended for use in pairs, as shown in the illustration, and each unit, which occupies a floor space of 30½ by 42 in., will support a stack of sheets up to 32 in. high, with a maximum weight of 900 lb. A stack of sheets, on which operations are to be performed, is loaded on to a table at one side of an associated machine, with the aid of a fork-lift truck, for example. Each sheet is then removed, in turn, from the top of the stack and transferred to the machine for processing, and, when the operation has been carried out, is passed to the other table. As this procedure is repeated, the first table is raised and the second table is lowered, automatically, by a hydraulic system and springs, so that the tops of the stacks are maintained at the same height. The working height of the stacks can be adjusted.

The hydraulic system does not require power supply, and pressure fluid is passed from one table to the other through a single pipe. These tables, which are the subject of a patent application, can be positioned at a considerable distance apart and at different levels, if required.



Crosland work tables, with automatic adjustment for height, for handling sheet materials

The New Ludwigsburger Factory

Ludwigsburger Maschinenbau, G.m.b.H., Ludwigsburg, Wurttemburg, Germany, who build the Burr fine-boring and special-purpose machines, recently celebrated the tenth anniversary of the foundation of the company, and the opening of their new factory. The company originally occupied the Koenigin-Olga Barracks, in Ludwigsburg, where the drawing and estimating offices are still housed, pending the completion of further buildings on the new site. Foundations of the new works were laid in 1955, and the buildings recently completed comprise a large assembly bay, with a working area of about 56,000 sq. ft., and two machining bays, with a total area of about 65,000 sq. ft. In addition, there is a number of auxiliary departments, including a heat-treatment shop, with nitriding and other equipment, an inspection department, laboratories and development departments, and an apprentices school.

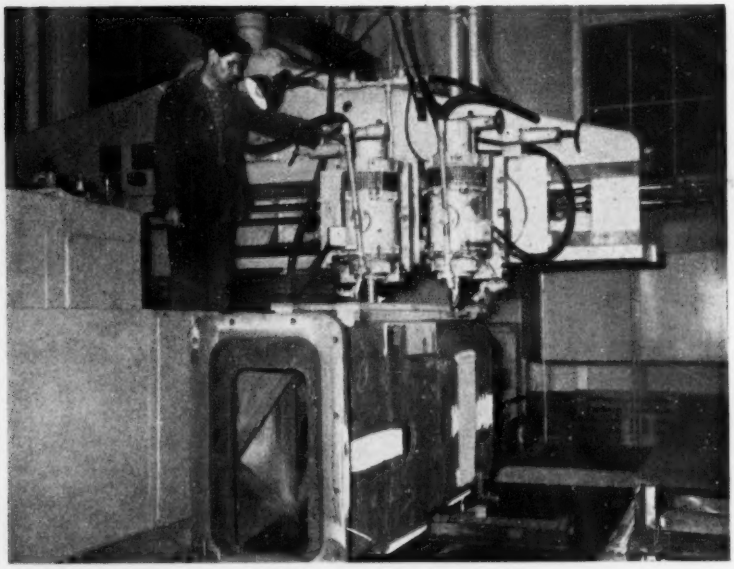
The main building of the new factory is shown in the heading illustration, and is particularly noteworthy for the high standard of natural and artificial lighting throughout, also for the imaginative use of colour. All the main production departments are on the same floor, below which there are shops for the production of electrical and hydraulic sub-assemblies, cloakrooms, and washing facilities. The space in the foreground, at present used as a car park, provides for future development, and a new office block is to be built shortly. At the rear of the main building there is a large area employed for the storage of castings and other raw materials, and it may be of interest to note that the company stress-relieve all major castings, after rough machining, by vibrating them on a special rig. This treatment occupies only two hours, as compared with the six hours that were required previously when stress relieving was carried out by the more conventional method of heating the castings in a furnace.

About 800 people are now employed by the company, of whom 150 are engaged in the design and associated departments. There are some 450 workers in the production shops, and 80 apprentices. The latter are trained in a separate section, which is well equipped, and the company pay particular attention to their instruction, which is regarded as an important investment for the future.

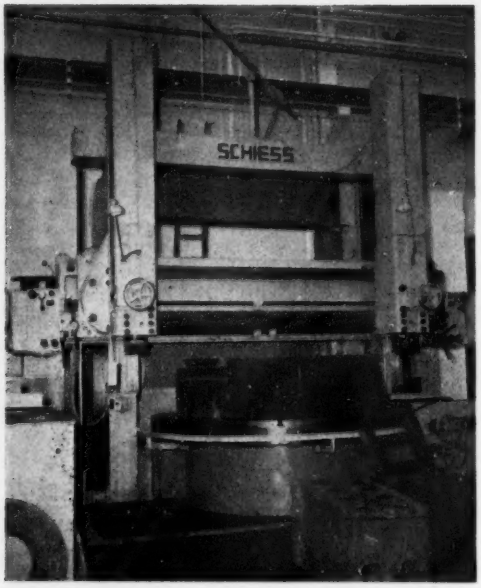
All deparments are served by overhead cranes and other handling aids. The machine tools and other equipment are of modern type, and many are particularly suitable for operations on large machine tool members. There is a well-equipped standards room, where the facilities include a spectrograph for the analysis of the various workmaterials employed. Some of the machine tools and other units installed in the works are shown in the accompanying illustrations.

The opening ceremony was attended by representatives from German government and industry, including Dr. Karl Frank, the Finance Minister, who made the principal speech. The first speaker was Mr. Walter Trampusch, who briefly outlined the history of the Ludwigsburger Maschinenbau, and paid a tribute to his partner in founding the company, Mr. Willi Burr, who died some two years ago. There were also representatives from many leading industrial organizations in other European countries, including a number from Great Britain.

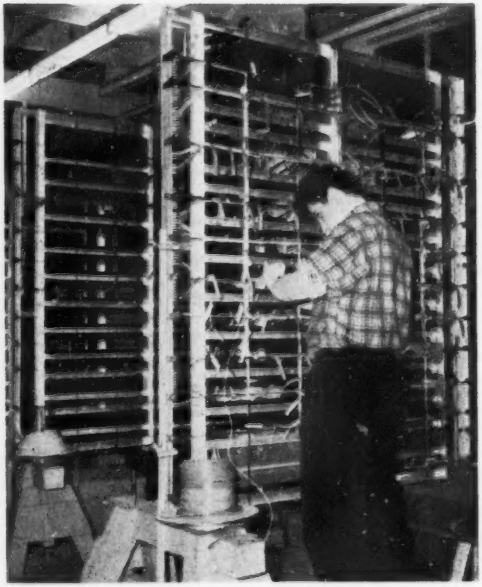
Burr fine-boring, special purpose and transfer machines are sold in this country by Geo. Kingsbury & Co. (Machine Tools), Ltd., 54 Victoria Street, London, S.W.1.



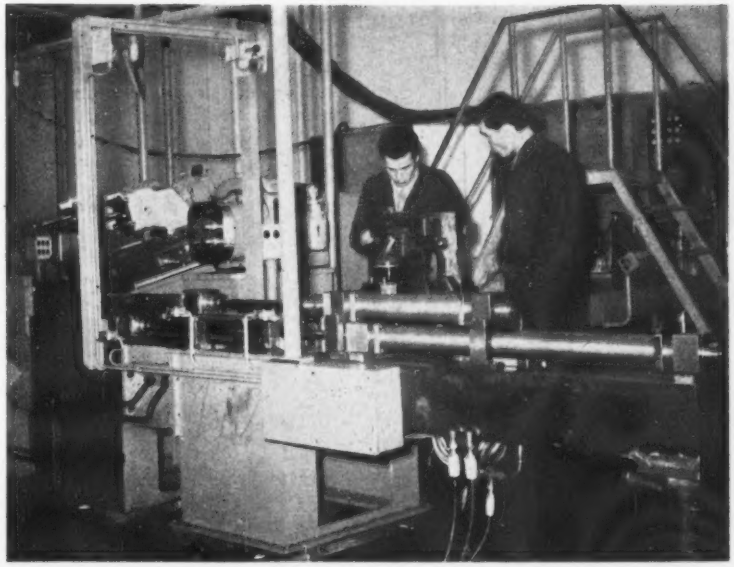
Hardened slideways of column and bed castings are ground on this special Billeter open-side machine. Supported on a floor plate, the workpiece remains stationary, and the grinding unit is traversed past it. The grinding unit has a massive column with a cross beam that can be adjusted for height. On the beam, there are two side-grinding heads at one end, as shown, and a large face-grinding head at the other, with a segmental wheel, which can be readily swung into the working position



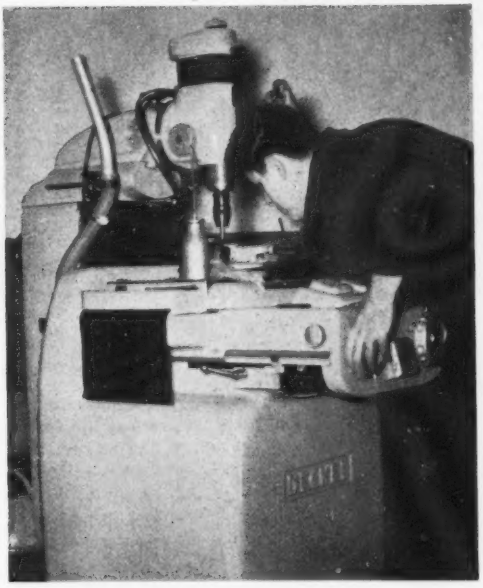
In the Ludwigsburger plant, there are two Schiess vertical boring and turning mills, the smaller of which has a 5-station turret. The larger machine has an 8-ft. diameter table, and is here seen set up for machining, simultaneously, three bed castings to support the unit heads of a transfer machine



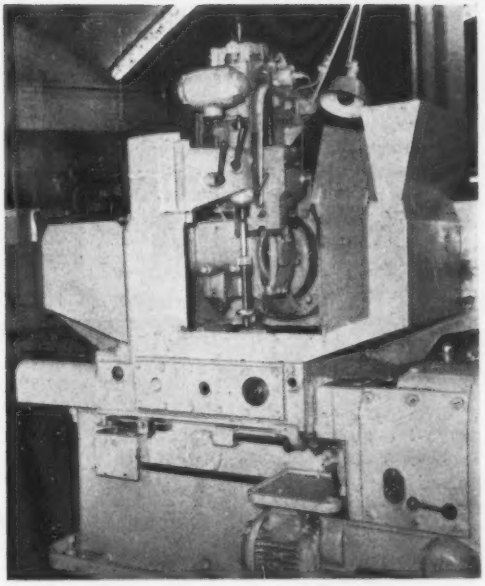
To facilitate the wiring of control panels, support wires are attached to a frame to form a large-mesh grid. The connecting wires are secured to the support wires, and when wiring has been completed, the support wires are cut adjacent to the frame to leave a self-sustaining grid of connection wires



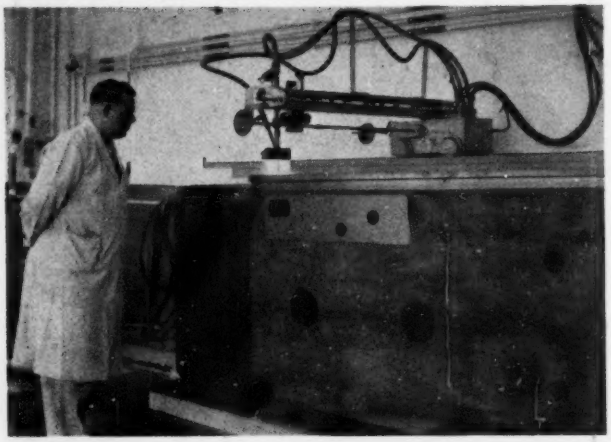
The unloading end of a Ludwigsburger transfer machine for operations on the cylinder blocks for the engine of a new small car now being built in the Netherlands. This machine has nine working stations, with idle stations interposed to provide ready access for servicing and tool setting. Workpieces are mounted on platen jigs, which are moved from one station to the next by hydraulically-actuated shuttle bars. The jigs are returned to the loading station by a U-shaped conveyor at the rear



This Deckel type LKB/S jig borer has an optical positioning system whereby workpieces can be set within 0·00008 in. A grinding attachment can be fitted for finishing holes down to 0·024 in. diameter, and there is a loudspeaker system to indicate when the wheel contacts the work

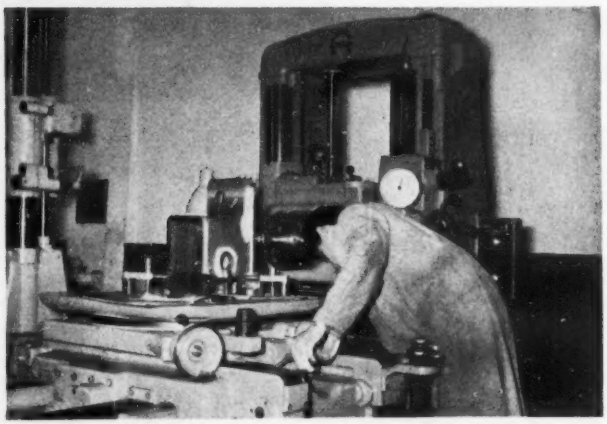


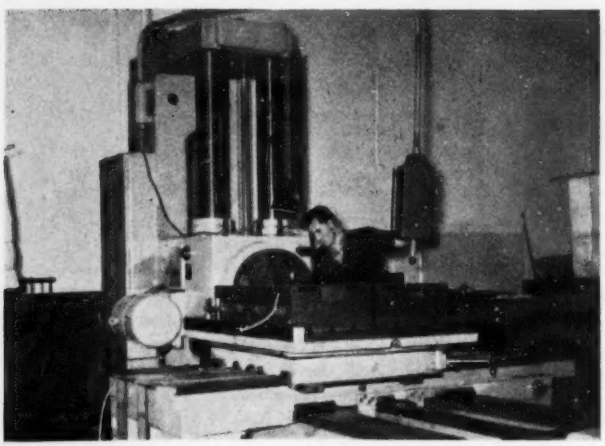
One of the two Niles gear grinding machines at the Ludwigsburger factory. One tooth-flank is ground as the table is traversed in one direction, and the other flank, during the return stroke. Gears ranging from $\frac{1}{2}$ to 6 module, and up to $10\frac{1}{2}$ in. diameter by $4\frac{3}{4}$ in. wide can be ground



The slideway surfaces of columns and other machine members are flame-hardened on this Pyrodur type LMH equipment, with the workpiece mounted on the trolley whereby it is transported. A mixture of town gas and oxygen is used for heating, and the burner head incorporates jets for the quenching water which drains through grids in the floor. A hardness of 450-530 Brinell is obtained for a depth of 0·078 in. Similar equipment is installed for flame-hardening shafts up to 4 ft. long.

All the bores and faces for a housing for a 4-spindle unit are machined at one setting on this Dixi machine. The faces are held to a tolerance of ±0·0004 in. from a datum plane. Four holes are bored at one end to 1·890 in. diameter, −0, +0·0012 in., and at the other end to 1·378 in diameter, −0·0002, +0·0004 in. The machine is housed in a temperature-controlled room, where a Hydroptic 7 and two other SIP jig borers, also an Oerlikon machine, are installed. All work is brought into the room 24 hours before it is machined





This Scharmann type FB 100 horizontal boring machine is here seen set up for finishing operations on two spindle heads for Burr fine-boring units. The machine has an optical measuring system and the saddle for the worktable is supported on hardened slideways. Guide members of circular cross-section are provided for the headstock and support bearing. Other horizontal borers in the same bay of the new Ludwigsburger factory include two by Collet & Englehardt, and a large Giddings & Lewis machine

Buswell & Sweeney Master Bar Jig Borer

Recently introduced by Buswell & Sweeney, Ltd., Bolton Street, Watery Lane, Birmingham 9, the jig borer shown in Fig. 1 incorporates the patent Master Bar measuring system developed by the company.

Fig. 2 gives a close-up view of the measuring system for setting the work table longitudinally, and there is a similar arrangement for positioning the saddle on the bedways. The measuring bar *A* consists of a number of hardened steel gauge blocks with lapped contact surfaces, each of which has a step at one end, and is made to an overall length of 1 in. within very close limits. These gauge blocks are assembled with plain and stepped ends in contact, and are clamped endwise by a threaded rod and nuts. The measuring bar is mounted in a central slideway in the saddle, and the drum-type micrometer head *B*, which gives readings to 0·0001 in., is attached to its outer end. A slot is provided lengthwise in the top face of the measuring bar to take a stop, in the form of a pivoted, spring-loaded arm, mounted vertically in the carrier *C*. A cylindrical extension piece, integral with this carrier, can be moved axially in a bore in the end face of the table for adjusting the stop for reference setting, as will later be explained, and is secured by means of a clamping screw.

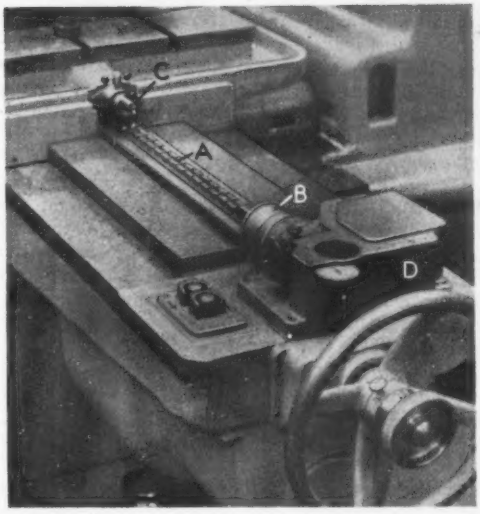


Fig. 2. Close-up view of the Master Bar measuring system employed on the Buswell & Sweeney jig boring machine

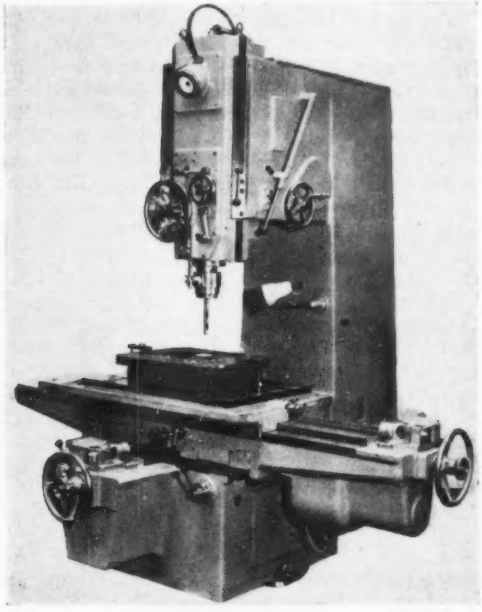


Fig. 1. The Buswell & Sweeney jig borer with Master Bar measuring system

A table setting to the nearest inch value, short of the required position, is selected by inserting a ¼-in. diameter roller in one of the transverse slots formed in the measuring bar by the abutting plain and stepped ends of two gauge blocks. Numerals are marked on the saddle at the sides of the measuring bar to facilitate selecting the required slot. Lengthwise adjustment of the measuring bar for any remaining part of an inch, to give the final required setting, is then made by means of the micrometer *B*. Next, depression of a push button mounted adjacent to the micrometer, causes the table to be traversed on the saddle guideways by a motor-driven screw. When the stop in the carrier *C* makes contact with the roller, the measuring bar and micrometer assembly is moved lengthwise with the table for a short distance against the action of a spring. At the end of this

travel, when the table has been brought to within 0·01 to 0·015 in. of the required position, two micro-switches housed in the casting *D* are operated successively. One of these switches interrupts the power supply to the traverse motor, and the other applies a magnetic brake to stop the table. The traversing screw is then disengaged from the driving motor by release of a knob-operated clutch, and the table—and with it the measuring bar and the micrometer—is finally moved to the required position by turning a hand-wheel until a zero reading is obtained on a dial indicator.

At the completion of a jig boring operation at one setting, the table is power traversed on the saddle ways in the opposite direction by depression of a second push button, to move the stop in the carrier *C* clear of the roller. The latter can then be removed from one slot in the measuring bar, and inserted in another in readiness for setting the table in the next required position.

When a datum point on the work has been set coincident with the centre line of the spindle at the beginning of a series of jig boring operations, a reference setting for the measuring system is made in the following manner. The micrometer *B* is set to zero, and the measuring bar and micrometer assembly is moved lengthwise, by means of a knob, until a zero reading is obtained on the dial indicator. This assembly is then held by a clamping screw, so that movement by the action of the spring is prevented. Next, the roller is inserted in the nearest slot in the measuring bar *A* to the stop in the carrier *C*. The stop is now brought into contact with the roller by movement of the carrier *C* axially, and, finally, the clamping screw is released.

The spring which holds the stop in the vertical position in the carrier *C*, exerts sufficient force to resist the contact pressure applied between the stop and the roller, during the final stage of the power traverse movement of the table when setting is being carried out. In the event of accidental over-run of the table, however, the stop pivots against the action of the spring so that it passes over the roller. Separate micro-switches are provided to stop the traverse motor when the table reaches the extreme positions at the ends of its travel.

The 42- by 25-in. table has a longitudinal travel of 30 in., and the cross movement of the saddle is 18 in. Power traverse, in each direction, for approximate setting purposes is at the rate of 60 in. per min.

The traverse screws run in oil baths, and the square-section ways on the substantial, well ribbed, bed and saddle are automatically lubricated.

THE SPINDLE HEAD ASSEMBLY

Steplessly variable spindle speeds up to 1,800 r.p.m. are provided by a Churchill-Sturm, 2½-h.p., hydraulic drive unit, and a 2-speed gear box, which are housed in the rigid, box-section column. This arrangement obviates the need for a clutch and a spindle brake. Gear changes are made by a lever on the side of the column, and two levers are mounted on the front of the bed for stepless adjustment of the spindle speeds. A large-diameter tachometer is provided on the spindle head to facilitate setting. It is proposed to incorporate a Churchill-Sturm unit of different design on future machines, and selection of spindle speeds will then be made by means of a single lever.

The spindle is mounted in line with the V-shaped guideways for the head, as viewed from the side of the column. Consequently, there is no overhang, and it is claimed that exceptional rigidity and freedom from vibration are thus ensured. Two precision ball bearings are provided for the nose end of the spindle, and roller bearings for the centre and upper end, and the quill, which is automatically lubricated, has an axial travel of 9 in. Four power feeds ranging from 0·001 to 0·008 in. per rev. are obtainable. A dial indicator spindle stop is fitted to facilitate boring holes accurately to pre-determined depths.

The spindle bore has a taper of 3½ in. per foot, and three slots are provided in the face of a locating ring at the nose end, to receive driving dogs integral with the shanks of interchangeable cutting tools. One of these slots, and the mating dog on each shank, is wider than the others, to ensure that a tool is always mounted in the same angular relationship to the spindle. The head has motorized adjustment of 16 in. on the column, and the maximum distance obtainable between the spindle nose and the working surface of the table is 30 in. Fine hand adjustment is also provided, and at the completion of setting, stresses in the traversing screw can be released by rotation of a knob, to ensure that there is no deflection of the head when the hand operated clamps are applied for securing it to the column ways.

The machine occupies a floor space of 115 by 115 in. and weighs approximately 5 tons. Stanley Howard, Ltd., 73 Devon Street, Saltley, Birmingham, 7, have been appointed distributors for Master Bar jig borers.

DELIVERIES OF ENGINEERS' SMALL TOOLS and instruments during the first half of this year averaged £5,503,000 per month, as compared with £5,721,000 for the full year 1957.

News of the Industry

Bradford

CROFTS (ENGINEERS), LTD., Thornbury, are well employed on the production of their extensive range of power transmission equipment for customers both at home and abroad. Work in progress includes air-actuated magnetic and mechanical clutches, conveyor drives, flexible couplings and drives, machine-cut gears, plummer blocks, shaft-mounted gear units, variable-speed motor gears, variable-speed pulleys, V-rope drives, and worm reduction gears. Our attention was drawn to the firm's recently-developed, stationary field, magnetic clutch and brake, which is available in wet- or dry-plate types for gearbox installation, coupling two shafts, or for use with pulleys, sprockets, or gear wheels. Other activities include the production of iron, steel and non-ferrous castings.

CARTER GEARS, LTD., Thornbury, are experiencing a good demand for hydraulic steplessly-variable speed gear units which range in size from ¼ to 35 h.p. Orders are in hand for the Continent and markets further afield. Units are available with different methods of control and mounting arrangements, in conjunction with electric motors and reduction gears, and the field of application is being steadily extended. Further developments are in progress and additional plant has been installed to facilitate production.

T. BOWERS & CO. (TOOLMAKERS), LTD., Thornbury, have a variety of jigs, fixtures, tools, gauges, reamers and special milling cutters on order, and the associated BOWERS INTERNAL GAUGE CO., LTD., report an expanding demand for internal micrometers, counterbore tool sets, and 2- and 3-point plug gauges. The internal micrometer range now includes ½ to ⅝, ⅝ to ¾, and ¾ to 1 in. sizes, with either English or Metric graduations, also a 9-in. diameter instrument. Recent plant additions at these works include Jones-Shipman cylindrical and surface grinding machines, a Taylor-Hobson pantograph milling machine, and a Milwaukee swivel-head vertical milling machine.

MOORE MANUFACTURING CO., LTD., Laisterdyke, report a steady flow of orders, on both home and export account, for their full ranges of drill sleeves and sockets, in addition to lathe and grinding machine centres of all types, and standard and special milling cutters. Extensions have now been completed and are in full operation.

STERLING MANUFACTURING CO., in addition to orders for independent and self-centring lathe chucks, are experiencing a steady demand for sub-contract machining work, which involves turning, boring, milling, and drilling operations.

BENSON VERNIERS, LTD., have a good order book for their various precision measuring instruments,

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Primarily to meet the needs of the dental profession for small, high-performance, silent air compressors, Alfred Bullows & Sons, Ltd., Long Street, Walsall, Staffs., have introduced three new Hydrovane units, one of which is shown, with the glass fibre cowl removed, in the illustration. It is anticipated that these compressors will also find numerous applications in industry. Known as the 2AR301E, the unit shown comprises a receiver-mounted Hydrovane rotary compressor driven by a ½-h.p. motor. The latter is controlled by a pressure switch with a range of 35 to 40 lb. per sq. in.

which include vernier calipers, height and depth gauges, gear tooth calipers, and beam trammels of various sizes. The recent introduction of hard chrome-plated instruments with clear-reading scales on a satin-chromium background has stimulated demand, and the chromium-plating plant which has been installed is now in full operation. Other work in hand includes reference verniers, rolling mill gauges, and linear and circular graduated scales for machine tools.

HENRY MILNES, LTD., report some reduction in the demand for their standard 13-in. swing lathe, admitting 38 and 72 in. between centres, and for the standard vertical milling machine with a table capacity of 30 by 8½ in. They are, however, increasing the production of their sliding head, elevating-table, heavy-duty fine boring machines, for which the Rockwell Machine Tool Co., Ltd., Welsh Harp, Edgware Road, London, N.W.2, are the sole selling agents. Orders have recently been booked from well-known machine tool makers, to whom the precision boring limits which can be obtained will prove of considerable value.

FLEXICON, LTD., inform us that there is a steadily-maintained demand for their various types of belting from customers in both the home and export markets. Round and V-belts are being supplied for various industrial applications, and F.S.H.O. belts for the coal-mining industry. Other types in steady request include nylon-cored V-belts and elastic-cored, miniature, fixed-centre V-belts. Orders are also in hand for link V-fasteners for use with V-section belts.

HINDLE AUTO PRODUCTS, LTD., state that the broaching and splining services which they provide are proving increasingly popular, and that orders for gear- and rack-cutting and for standard and special gearboxes are maintained at a good level. Racks up to 32 ft. long, on 3 "by 2½ in. section bars, have recently been cut for use in connection with pile-driving operations, and we may note that broaching and splining work has been carried out on medical instrument and cobalt ray machine parts.

MERCER PNEUMATIC TOOLS, LTD., are occupied with the production of ½-in. capacity motor-driven bench drilling machines, 9-in. circular bench wood sawing machines, automatic turret locks and coolant controls for capstan lathes and automatics, and components for pneumatic sanding equipment and hack-sawing machines.

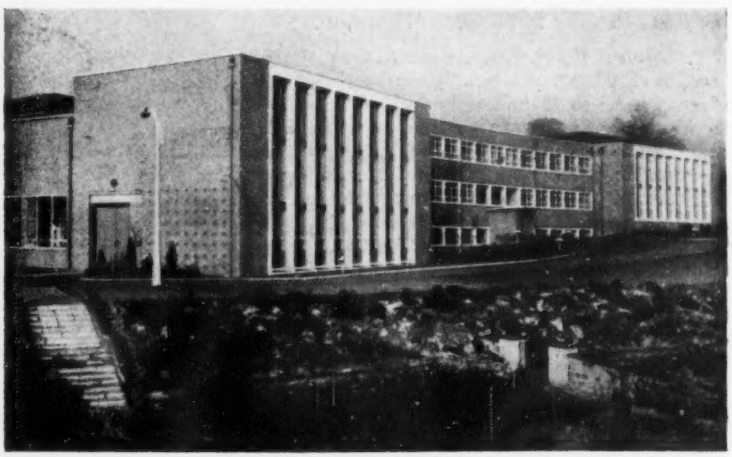
H. B.

Ferodo Research Centre

Ferodo, Ltd., Chapel-en-le-Frith, Derbyshire, a member company of the Turner & Newall organization, have recently completed a research centre, at a cost of £750,000, adjacent to the main works. It was officially opened by H.R.H. Prince Philip, Duke of Edinburgh, K.G., on November 21.

The centre, which is a 3-storey building with more than two acres of floor space, has enabled all the chemical, physical and experimental production laboratories, test house, test fleet garage, and research administration to be brought together, for the first time, under one roof. It will perform an important function for science and industry, by reason of the effort that will be concentrated on the study of friction phenomena and the development of friction materials.

Accommodation provided in the new building is divided into four main sections. The test house wing, with accompanying workshop, garage, stores, and local administrations is on the left. Administration, conference room and library are housed in the front centre, and the physical and chemical laboratories are behind the administrative block. In the right wing, there is an experimental



The new research centre of Ferodo, Ltd., for the study of friction phenomena and the development of friction materials

production department, with associated stores and preparation rooms.

Friction materials were first produced in 1897 by Herbert Frood, founder of Ferodo, Ltd., in a small wooden hut at the bottom of his garden. Today the works cover more than 16 acres and provide employment for more than 3,000 people.

Gredag Pressing Lubricant for Titanium

It is reported by Acheson Colloids, Ltd., that The de Havilland Aircraft Co., Ltd., have adopted Gredag molybdenum disulphide grease (grade MP 30) as a titanium pressing lubricant on the basis of tests carried out by their Production Research Department. The lubricant is employed when producing hot titanium pressings on drop hammers, and the tests were carried out with the object of eliminating troubles caused by molybdenum disulphide build-up on the tools. It was found that Gredag MP 30 enabled good pressings to be produced, was easy to apply and economical in use, and did not build up, so that the need for cleaning the tools was eliminated. Gredag, it may be noted, is a registered trade mark of Acheson Industries (Europe), Ltd., of which Acheson Colloids, Ltd., are licensed users.

Machine Tool Merchants

The British Association of Machine Tool Merchants (Inc.), Effingham House, Arundel Street, Strand, London, W.C.2, held their annual general meeting luncheon at the May Fair Hotel, London, on November 25. As in previous years, there was a good attendance and the company included a number of distinguished official guests. The toast of "The Queen" was proposed by the newly-elected president, Mr. S. Plastock, and Mr. W. J. Taylor, C.B.E., D.L., J.P., M.P., Parliamentary Secretary, Ministry of Supply, then proposed "The Association." In his speech, Mr. Taylor referred to the substantial scale of machine tool sales by the Ministry during the past two years, and expressed the opinion that the level would be maintained in the immediate future. It was now established policy to co-operate with the B.A.M.T.M. He believed that recent financial measures should be of benefit to members, particularly the reduction of Bank Rate and the relaxation of credit restrictions. The country had passed through a difficult period but he anticipated a high level of industrial activity this time next year, and he advised his hearers to look to the future with confidence.

Responding to the toast, Mr. Plastock spoke of the good relations that existed between the Association, the Ministry of Supply, the Board of Trade, and the machine tool manufacturers. He agreed that after a period of difficulty there were signs that industry had turned the corner.

Mr. H. Widdowson, immediate past-president of the B.A.M.T.M., proposed "The Guests," and in replying, Mr. J. C. Blair, C.B.E., said that the Association had a great function which it was performing very well.

At the 18th annual general meeting, which preceded the luncheon, Mr. S. Plastock (F. J. Edwards, Ltd.)—as mentioned above—was elected president for the coming year in succession to Mr. H. Widdowson (Herbert Widdowson & Sons, Ltd.), who remains a Council member as immediate past-president. Mr. R. Gidley [Martin Bros. (Machinery), Ltd.] was elected vice-president, and Mr. E. J. F. Bradley (Pidgen Bros., Ltd.) was re-elected hon. treasurer.

Mr. S. Plastock

Mr R. Gidley

Chinese Orders for Machine Tools

The China National Machinery Import Corporation has placed two large orders with British machine tool firms, following the virtual lifting of the strategic ban last August in respect of Soviet bloc countries and China. It is stated that both orders were obtained in the face of severe foreign competition, particularly from Germany.

One order has gone to the Asquith Machine Tool Corporation, Ltd., Halifax. The value exceeds £600,000 and the items include some horizontal milling and boring machines of exceptionally large capacity. It is stated that the greater part of the contract is to be completed by the end of 1959, and it is pointed out that the ability to execute an order of this magnitude is a result of the far-sighted policy of the company in developing new facilities.

The second order, placed with the Machine Tool Division of the David Brown Group of companies, is for turbine gear hobbing machines to the value of approximately £500,000, complete with measuring instruments and gear cutting tools. Two of these machines will be of 216-in. capacity, and it may be noted that a similar hobber is being installed by the company in a German shipyard.

New Foundry of John Hall & Son

The old-established firm of John Hall & Son (Oldham), Ltd., Union Iron Works, Oldham, a subsidiary of Dronsfield Bros., Ltd., Atlas Works, Oldham, have recently completed the re-building and re-organization of their iron foundry for the production of Unihall castings. A large number of business executives attended the official opening ceremony on November 20, which was performed by the Mayor of Oldham, Councillor James Bradley, with Mr. S. W. Dronsfield, chairman of the company, presiding.

Covering a floor area of 16,000 sq. ft., this modern foundry has good natural and artificial lighting and is served by Wharton 25- and 35-ton overhead electric travelling cranes. Castings up to 30 tons in weight are produced, and include diesel engine bedplates and columns and machine tool beds. Laboratory control facilities are available for mixing and melting ordinary, high-duty and special irons. There are three cupolas with a melting capacity of 15 tons per hour, and other equipment includes Hydroblast wet process and wheelabrator dry process cleaning plants.

Russia—A Challenge

(*Continued from page* 1271)

manufacture of many engineering products, including machine tools, heavy commercial vehicles, and electrical equipment, and it appears that these products are at least competitive in cost with those made in this country. In view of the intensive research that is being pursued with regard to the means of production generally, and automation equipment and processes in particular, moreover, it is likely that the cost of many engineering products will be substantially reduced in the future.

As a manufacturing and exporting nation, we cannot afford to ignore the significance of this potential challenge from Russia, and within the next few years must take the necessary measures to meet it. We should provide every encouragement to ensure that the most promising young men and women in the country are attracted to the engineering and allied professions, and, at the same time, should intensify our efforts to improve facilities for technological and scientific education, in order that the recruits to our industries, and—even more important—our research establishments, may be adequately trained. In addition, by research and development, we must not only improve existing products and introduce new designs, but ensure that the most effective production techniques and equipment are employed for their manufacture.

Personal

MR. JOHN DODD, 58 Avon Crescent, Stratford-on-Avon, has been appointed Midlands technical representative for The Sheffield Twist Drill & Steel Co., Ltd., for the demonstration and sale of the Dormer drill sharpening machine.

MAJOR-GENERAL E. P. READMAN, C.B.E., T.D., who recently retired from English Steel Corporation, Ltd., has joined the boards of Darwins Group, Ltd., and Andrews Toledo, Ltd., also of The Sheffield Forge & Rolling Mills Co., Ltd., and the other subsidiary companies of the Group.

MR. GEORGE P. TINKER (chairman), MR. J. C. HOWARD (managing director), MR. F. S. LEIGH (assistant managing director), MR. D. L. CAMPBELL, MR. J. H. CROSSLEY, MR. P. F. HANCOCK, MR. J. A. MONKS, and MR. T. G. TANNER, comprise the board of the newly formed company Birlec-Efco (Melting), Ltd. The secretary of the company is MR. J. C. MANTELL, and the offices are at Westgate, Aldridge, Staffs.

Mr. George P. Tinker

Mr. W. J. Cleverly

MR. W. J. CLEVERLY has been appointed sales manager of the Bonded Abrasives Division of The Carborundum Co., Ltd., Trafford Park, Manchester, 17, in succession to Mr. F. W. Noble who has held the position for the past 10 years. Mr. Cleverly joined the company in 1939, and returned to them in 1946, after service in the R.A.F. He spent two years under training and in 1948 he was appointed sales representative for abrasive products in the Lancashire area. Subsequently, in 1952, he was transferred to the London and Home Counties area, where he spent several years representing the Bonded Abrasive Products Division.

MR. B. E. RICHMOND has relinquished his position as general factory manager of Tecalemit, Ltd., Plymouth, Devon, to enable him to concentrate his activities as managing director of Foamite, Ltd., a member company of the Tecalemit group. He has been succeeded by MR. J. E. DRINKWATER, who was previously chief production engineer, and, latterly, deputy general factory manager. MR. H. E. JACKSON, B.Eng., has been appointed chief engineer.

Gauge and Tool Makers

A luncheon for representatives of members of the Gauge and Tool Makers' Association, Standbrook House, 2-5 Old Bond Street, W.1, was held at the Savoy Hotel, London, on November 27, and was followed by the 16th annual general meeting. In an address at the luncheon, Mr. F. W. Halliwell, C.B.E., M.I.Mech.E., M.I.Prod.E., first made reference to the prevailing trade conditions, and mentioned that he saw little evidence of early improvement. He urged members to work together within the Association to help one another as much as they could, provided that they did not "cut across free and honest competition." There was much that the Association could do to help members, and he advised them to seek such assistance.

Mr. Halliwell then went on to announce that he had decided to resign from the presidency of the Association to make way for a younger man. He had held this office for a long time, and had previously been chairman. Now, he and the other office bearers had persuaded Sir Stanley Harley, B.Sc., M.I.Mech.E., M.I.Prod.E., the deputy president, to accept the presidency. This recommendation had already been approved by the Council, who would ratify it at the first meeting of the new session, next month. Throughout his long period of office, he had received the support and assistance of a most enthusiastic body of founder-members and others who had since joined, and he asked them to extend the same support and assistance to the new president and the other officers.

He was proud, he continued, of the growth of the Association and of his connection with it. They had built an industry from a collection of firms, and the importance of that industry was now recognized, not only in Government circles but in the wider field of the national economy as a whole.

Mr. Halliwell then presented G.T.M.A. certificates to the following successful applicants: (Craftsmanship)—E. H. Brooks (Gay's [Hampton], Ltd.); J. H. Keetch (Belsize Engineering Co., Ltd.); T. S. Froggatt and E. H. Eames (B.S.A. Tools, Ltd.); C. I. Rockey, M. W. Unett, W. M. Upton, and G. W. Ward (Coventry Gauge & Tool Co., Ltd.). (Gauge and Tool Design and Draughtsmanship)—F. E. Needham (Coventry Gauge and Tool Co., Ltd.).

Sir Stanley Harley

Mr. L. Van Moppes, chairman of the Association, proposed the health of Mr. Halliwell, the retiring president, and of Sir Stanley Harley, the president-elect.

In a short speech, Sir Stanley Harley then paid tribute to the work that Mr. Halliwell had done for the Association during a period of 16 or 17 years. He thanked the members for the way in which they had received the suggestion that he should succeed Mr. Halliwell as president, and expressed the hope that when the time came for him to retire it would be found that the incoming president had as high a regard for the outgoing president as he personally had for Mr. Halliwell.

Books Received

DIE TRAGFAHIGKEIT DER ZAHNRADER. By A. K. Thomas, Carl Hanser Verlag, Kolbergerstrasse, 22, München 27. 182 pp. [Price 14·80 D.M.]

Concerned with "the load-carrying capacity of toothed gears," this book is divided into four sections. The first is devoted to spur and helical gears, the second to straight and curved tooth bevel gears, the third to worm gears, and the fourth to spiral gears. Tooth and bearing loading aspects are considered, and numerous worked-out examples are included.

AIDS TO WORKSHOP PRACTICE. By C. T. Bower, A.M.I.Prod.E. Odhams Press, Ltd., Long Acre, London, W.C.2. 192 pp. [Price 18s. 0d. net.]

A collection of hints, tips and practical ideas is presented in this book and there are descriptions of various devices that have proved of practical assistance in the working of metals and other materials. These devices facilitate assembly, drilling, sawing, lathe-work, painting, sanding, tapping, and other workshop operations. They are fully illustrated by means of clear diagrams and photographs.

PRODUCTION PLANNING AND INVENTORY CONTROL. By J. F. Magee, McGraw-Hill Publishing Co., Ltd., 95 Farringdon Street, London, E.C.4. 333 pp. [Price 58s. 0d. net.]

There is no doubt that efficient and systematic stores control and material purchasing are essential for competitive production. Without them, real production planning becomes impossible. The author of this book has analysed all the various aspects of planning and stores control. Starting with the objective problems and systems of inventory control, he discusses the functions of the various stock points, the cost factors, and the method of determining the size of a manufactured or purchased lot. Next, the influence of uncertainty, forecasting, control of production levels, and the scheduling of production are considered. Finally, various problems of distribution, and the design of the production-control system are discussed. Appendixes occupying some 30 pages give the derivations of economical order-quantity formulae, rules for production control, and the techniques of seasonal planning.

Coming Events

INSTITUTION OF ELECTRICAL ENGINEERS. *East Midland Centre.* December 12, at 7.15 p.m., at the Technical College, The Newarkes, Leicester; paper on "The National-Elliott 405 Computer and Its Application to Production Procedures," by H. A. Mathews.

INSTITUTION OF PRODUCTION ENGINEERS. *Sheffield Section.* December 8, at 7.15 p.m., at the Grand Hotel, Sheffield; lecture on "Argon Arc Welding of Corrosion and Heat Resisting Steels," by Dr. J. A. McWilliam. *Leeds Section.* December 8, at 7 p.m., at the Hotel Metropole, Leeds; lecture on "A Modern Foundry for the Manufacture of Small Steel Castings by New Moulding Techniques," by J. H. Osborn. *London Graduate Section.* December 9, at 7.15 p.m., at the Institution, 10 Chesterfield Street, W.1; lecture on "Investment Castings by Centrifugal Methods," by I. L. Gwynn. *Luton Section.* December 9, at 7.30 p.m., in the Pink Room, W. H. Allen Sons & Co., Ltd., Bedford; lecture on "Nuclear Power and Its Effects on the Production Engineer," by I. Munro, B.Sc. *South Essex Section.* December 10, at 7.30 p.m., at the Social Centre of the Hoffmann Manufacturing Co., Ltd., New Street, Chelmsford; lecture on "Ergonomics in Industry," by Dr. W. F. Floyd. *Midlands Region.* December 10, at 7 p.m., at the Wolverhampton and Staffordshire College of Technology, Wulfruna Street, Wolverhampton; lecture on "Reduction in Costs through the Use of Transfer Presses," by L. Schuler. *Doncaster Section.* December 9, at 7 p.m. in the Technical College Hall, Doncaster; lecture on "Manufacture of Ball and Roller Bearings." *Halifax and Huddersfield Section.* December 9, at 7.30 p.m., at the Percival Whitley Technical College, Francis Street, Halifax; lecture on "Current Experimental Work with Sintered Oxide as a Cutting Tool," by R. N. Cook. *Northern Ireland Section.* December 11, at 7.30 p.m., at the Kensington Hotel, College Square East, Belfast; lecture on "The Background to Incentives and Industrial Motivation," by E. W. Hughes, M.A., B.Sc. *Liverpool Section.* December 10, at 7.30 p.m., at the Liverpool Technical Libraries, William Brown Street, Liverpool, 3; lecture on "Materials Handling—A Challenge to British Industries," by A. G. Hayek. *Southampton Section.* December 10, at 7.30 p.m., in the Ballroom, King's Arms Hotel, Christchurch; lecture on "The Electronic Control of Machine Tools for Aircraft Production," by H. Ogden.

INSTITUTION OF MECHANICAL ENGINEERS. *Southern Graduates' Section.* December 10, at 3.30 p.m., in Cockcroft Hall, Harwell; paper on "High-speed Photography as an Aid to Engineers," by A. Payne. *North Eastern A.D. Centre.* December 17, at 7.30 p.m., in the New Lecture Theatre, The University, Leeds; paper on "Air Suspension for Road Vehicles," by J. H. Sainsbury.

THE INSTITUTE OF METAL FINISHING. *London Branch.* December 15, at 6.15 p.m., at the Northampton College of Advanced Technology, St. John Street, E.C.1; paper on "Trends in Polishing," by J. P. Dewar.

MANCHESTER ASSOCIATION OF ENGINEERS. December 9, at 6.45 p.m., at the Engineers' Club, Albert Square, Manchester, 2; lecture on "Application of Hydraulics in Industry," by J. R. Fawcett, B.Sc. Joint meeting with the Incorporated Plant Engineers (Manchester Branch).

INSTITUTION OF ENGINEERING DESIGNERS. *North East Branch.* December 8, at 7.15 p.m., in the Northern Architectural Association Hall, 6 Higham Place, Newcastle-upon-Tyne, 1; paper on "Hydraulic Machinery," by D. C. Jeffrey and E. Rutherford.

INCORPORATED PLANT ENGINEERS. *Glasgow Branch.* December 11, at 7.15 p.m., at the Scottish Building Centre, 425-427 Sauchiehall Street, Glasgow; paper on "Can Formal Management Techniques Benefit the Work of the Plant Engineer?" by F. R. Curry.

Scrap Metals

†LONDON.—‡Prices per ton for non-ferrous scrap metals free from iron are as follows:—clean copper wire, untinned and free from lead and solder, £185; clean heavy copper, untinned and free from lead and solder, £175; copper wire, No. 2, £172; clean light copper, £162; braziery copper, £142; gunmetal, £146; brass, mixed, £102; lead, net, £59; zinc, £35; cast aluminium, £96; old rolled aluminium, £114; battery lead, £31; unsweated brass radiators, £92; hollow pewter, £505; black pewter, £375.

MIDLANDS.—Although trading, in general, is still restricted, there are signs of some improvement in the disposal of scrap. No. 4 bundles are moving steadily and occasional permit loading labels are issued for heavy steel to specifications No. 1 and 2. Heavy shovelling scrap (No. 3) cannot be placed locally, and large tonnages are being held by merchants. Various export orders are being executed, and although prices f.o.r. are not very attractive, it has been possible to reduce stocks from overburdened yards.

Light steel scrap is in demand for pressing, but, so far, no interest is being shown in light iron scrap. Chipped steel turnings are being consigned to blast furnaces in the Sheffield area, but supply still far exceeds demand and it is necessary for Midland merchants to stock the surplus material. The market for borings is spasmodic, but, fortunately, as one outlet closes another opens and stocking of such scrap has so far been avoided.

Prices of the lighter grades of cast iron have improved, and trading in all grades is keener.

More outlets for short steel are needed if all the material forthcoming is to be cleared, but limited tonnages are being placed at various prices.

Disposal of compressed destructor bundles is difficult and prices have eased considerably.

Current maximum control prices, delivered consumers' works, are now: *Heavy steel No. 1, 217s. 6d.; *heavy steel No. 2, 196s.; *heavy steel No. 4, 207s. 6d.; *heavy steel No. 5, 195s. 6d.; light iron No. 8, 149s.; short turnings No. 9 (free from alloy), 167s. 3d.; light steel No. 11, 164s. 3d.; bushy turnings, 117s.; short alloy turnings, 160s. 9d.; short steel No. 2, 233s. 3d.; machinery cast, 233s.

Prices may be increased up to 2s. 6d. per ton according to quantities tendered over a given period.

* For use by Round Oak Steelworks, Brierley Hill, increase by 1s. 6d. per ton.
† George Cohen, Sons & Co., Ltd., 600 Commercial Road, E.14.
‡ Subject to market fluctuations.

British Machine Tools for Leipzig

Several leading British machine tool firms will exhibit, next March, in the machine tool section of the Leipzig Spring Fair, on a collective stand which is being organized by The Machine Tool Trades Association, Brettenham House, Lancaster Place, London, W.C.2. It is pointed out that this will be the first large-scale promotional effort of the United Kingdom machine tool industry behind the Iron Curtain.

Industrial Notes

DUNLOP FOOTWEAR, LTD., Speke, Liverpool, are now marketing Safetymaster boots with steel toe caps tested to B.S. Specification A.1.

THE SOCIETY OF ENGINEERS will move to Abbey House, Victoria Street, Westminster, London, S.W.1, on December 15. The telephone number (Abbey 7244) will not be changed.

THE BRITISH THOMSON-HOUSTON CO., LTD., inform us that their London district office is now at 33 Grosvenor Place, S.W.1 (telephone number, Belgravia 7011). The British Thomson-Houston Export Co. is also located at this address.

THE TIN RESEARCH INSTITUTE, Fraser Road, Greenford, Middlesex.—The Autumn, 1958, issue of *Tin and Its Uses* includes articles on: tin-nickel plating for watch parts and drawing instruments; improving the finish of tinned wares; continuous casting of solder; and the tinning of wire for soldering.

THE PHYSICAL SOCIETY EXHIBITION in 1959 will be held, from January 19 to 22, at the Royal Horticultural Society's Old and New Halls, Westminster, London, S.W.1. Full particulars can be obtained from the Exhibition Secretary, 1 Lowther Gardens, Prince Consort Road, London, S.W.7.

BIRLEC, LTD., Erdington, Birmingham, 24, recently despatched a consignment of heat treatment equipment to Machinoimport, Moscow. This equipment included a standard 24-in. mesh belt conveyor furnace for heat treating steel components, a horizontal batch furnace for tool-room heat treatment, and a generator for maintaining protective atmosphere within the conveyor furnace.

THE ENGINEERING, MARINE, WELDING, AND NUCLEAR ENERGY EXHIBITION will be held next year at Olympia, London, from April 16 to 30. It will occupy three halls and there will be more than 500 exhibitors with total stand space exceeding 250,000 sq. ft. Full particulars can be obtained from the organizers, F. W. Bridges & Sons, Ltd., Grand Buildings, Trafalgar Square, London, W.C.2.

THOS. C. WILD (MACHINERY), LTD., Vulcan Works, Coleridge Road, Sheffield, 9, are at present holding an exhibition of machine tools. Machines which are being demonstrated include the latest Cawi twist drill point grinder, Harrison 8- and 5½-in. centre copy-turning lathes, Graham & Normanton heavy-duty lathes, Mitchell centre lathes, Invicta-Hydetsco openside planers, Ajax radial drilling machines, and Victoria milling machines.

THE WHITEHILL ENGINEERING CO., LTD., have recently moved from their Hillington factories to a factory on Craigton Industrial Estate, Glasgow, previously occupied by Rolls-Royce, Ltd. The managing director of the company, Mr. A. J. C. H. Weissenbruch, and the recently-appointed general manager, Mr. J. Rodger, who was previously superintendent mechanical engineer with Massey Ferguson, Ltd., have made arrangements to ensure a substantial increase in the output of press tools, jigs, fixtures and special-purpose machines. To this end, new machine tools of larger capacity have been installed, and particular attention has been paid to inspection equipment. We are informed that since the activities were transferred to the Craigton factory, an increased demand has already been experienced, both in the design and production departments.

Corrections

In the advertisement for Incandescent Heat Co., Ltd., Cornwall Road, Birmingham, 40, which appears on page 12 of this issue of MACHINERY, wrong wording has inadvertently been included and does not relate to the illustration. This advertisement, in its correct form, will be published next week.

In MACHINERY, 93/1266—26/11/58 it was inadvertently stated that Morrison, Marshall & Hill, Ltd., were the principals of Rushworth & Co. (Sowerby Bridge), Ltd. We express our apologies for this error. It is, of course, Rushworth & Co. (Sowerby Bridge), Ltd., who are the principals.

BRITISH MACHINE TOOL

Exports of New Machine Tools

Countries	Vertical Boring Machines		Other Boring Machines		Drilling Machines		Grinding, Lapping and Honing Machines		Automatic Lathes		Capstan and Turret Lathes		Other Lathes		Screwing Machines	
	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value
Commonwealth																
South Africa	—	—	11 (1)	308	112 (34)	2,560	942 (48)	27,900	53 (1)	2,444	—	—	503 (23)	13,501	15 (1)	580
India	222 (1)	6,750	78 (2)	5,649	567 (16)	22,487	1,605 (28)	56,779	—	—	863 (19)	41,358	487 (12)	15,447	26 (1)	3,270
Pakistan	—	—	—	—	20 (4)	390	34 (28)	2,033	—	—	—	—	89 (1)	2,099	—	—
Australia	1,552 (1)	30,739	245 (2)	9,996	410 (13)	8,760	254 (12)	13,788	377 (2)	14,687	277 (12)	9,789	906 (76)	31,795	29 (4)	989
New Zealand	—	—	—	—	15 (10)	478	40 (9)	710	—	—	—	—	312 (10)	7,277	—	—
Canada	—	—	—	—	70 (9)	1,716	292 (19)	13,944	—	—	85 (2)	3,685	608 (27)	21,157	—	—
Miscellaneous	220 (1)	3,000	190 (3)	3,436	162 (61)	4,324	226 (36)	10,320	—	—	198 (2)	8,156	559 (23)	14,777	19 (2)	829
Foreign																
Soviet Union	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sweden	250 (1)	4,980	—	—	83 (1)	1,186	52 (2)	5,135	—	—	190 (13)	6,658	—	—	—	—
Norway	—	—	—	—	—	—	—	—	—	—	—	—	27 (8)	1,109	—	—
Denmark	—	—	—	—	38 (1)	815	—	—	—	—	69 (2)	3,383	23 (2)	792	—	—
Western Germany	—	—	—	—	4 (1)	235	1 (1)	34	—	—	—	—	15 (1)	1,336	—	—
Netherlands	—	—	260 (1)	7,130	11 (8)	301	121 (5)	4,523	184 (2)	5,647	—	—	142 (3)	4,329	—	—
Belgium	—	—	—	—	8 (12)	316	6 (2)	263	—	—	187 (2)	7,958	6 (1)	193	—	—
France	—	—	88 (1)	6,198	32 (2)	1,107	52 (2)	4,280	914 (9)	43,224	—	—	56 (21)	2,531	—	—
Switzerland	—	—	—	—	54 (2)	1,307	2 (1)	70	—	—	—	—	—	—	—	—
Spain	—	—	—	—	140 (6)	7,279	387 (8)	17,709	167 (1)	9,617	—	—	—	—	—	—
Italy	593 (1)	16,700	—	—	—	—	415 (11)	24,156	796 (4)	33,057	—	—	—	—	20 (3)	1,730
U.S. America	166 (1)	3,986	—	—	308 (3)	6,414	138 (9)	6,877	75 (2)	2,026	—	—	658 (17)	21,506	—	—
Miscellaneous	—	—	5 (3)	480	452 (59)	10,541	548 (24)	31,182	437 (4)	25,348	482 (12)	32,530	725 (62)	28,369	15 (1)	330
Total	3,003 (6)	66,155	877 (13)	33,197	2,486 (242)	70,216	5,115 (245)	219,703	3,003 (25)	136,050	2,351 (64)	113,517	5,116 (287)	166,218	124 (12)	7,728
Amendments to previous accounts																
Commonwealth	—	—	—	—	+7 (−30)	+250	+528 (+2)	+14650	—	—	—	—	+126 (−6)	+3,158	—	—
Foreign	—	—	—	—	+41 (+8)	+255	+1 (+1)	+542	−185 (−1)	−4,195	+5 (—)	+250	+16 (+2)	+105	—	—

Total exports of reconditioned machine tools: Quantity: No., 166; weight, 11,049 cwt.; value, £67,622
Total exports of imported machine tools: Quantity: weight, 776 cwt.; value, £36,996.

Imports of New Machine Tools

Country of Origin	Boring Machines		Drilling Machines		Gear-cutting Machines		Grinding, Lapping and Honing Machines		Automatic Lathes	
	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £
Western Germany	201 (2)	10,181	—	—	74 (3)	9,604	680 (27)	42,799	1,709 (15)	74,578
Belgium	66 (2)	4,434	—	—	—	—	—	—	—	—
France	—	—	—	—	—	—	71 (2)	4,300	146 (2)	8,093
Switzerland	267 (4)	21,245	1 (1)	180	22 (3)	4,146	175 (7)	16,885	841 (19)	54,428
U.S. America	—	—	30 (6)	3,691	277 (1)	20,389	705 (6)	64,448	59 (1)	4,930
Miscellaneous	1,505 (4)	27,147	220 (7)	2,548	—	—	533 (18)	30,223	252 (6)	7,337
Total	2,039 (12)	63,007	251 (14)	6,419	373 (7)	34,139	2,164 (60)	158,655	3,007 (43)	149,366
Amendments to previous accounts										
Western Germany	—	−69	—	—	—	−16	—	—	—	—
Switzerland	—	—	—	—	—	—	—	—	—	—
U.S. America	—	—	—	—	—	—	—	−38	—	—
Miscellaneous	—	—	—	—	—	—	−1 (−2)	−152	—	—

Total imports of reconditioned machine tools: Quantity: No. 18; weight, 1,105 cwt.; value, £29,358.

IMPORTS AND EXPORTS (Classified)

and Parts during August, 1958

Threading Machines		Milling Machines		Gear-cutting Machines		Planing, Shaping and Slotting Machines		Presses		Sheet Metal-working Machines		Sawing Machines		Other Machines		Machine Tool Parts*		Total	
Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt.	Value £	Quantity. Cwt. and No.	Value £
—	—	297 (2)	10,712	—	—	39 (3)	1,070	2,027 (34)	40,862	—	—	14 (3)	268	789 (37)	14,792	563	13,719	5,365 (187)	128,716
96 (1)	8,153	940 (12)	42,499	—	—	—	—	2,047 (8)	53,603	25 (24)	364	384 (4)	10,143	786 (21)	18,234	253	16,687	8,379 (149)	301,423
—	—	—	—	—	—	—	—	4 (3)	1,451	—	—	—	—	19 (4)	881	110	1,671	276 (40)	8,525
15 (2)	770	354 (16)	14,665	—	—	554 (8)	11,989	716 (6)	13,242	127 (4)	3,786	21 (2)	552	988 (25)	65,790	315	24,430	7,140 (185)	255,767
—	—	—	—	—	—	—	—	466 (35)	8,779	9 (3)	490	4 (1)	94	56 (12)	2,085	69	2,848	971 (80)	22,761
—	—	213 (10)	7,974	—	—	89 (5)	1,691	210 (15)	7,983	5 (1)	280	12 (2)	287	86 (33)	4,449	133	5,511	1,803 (123)	68,677
—	—	297 (5)	11,554	22 (1)	588	55 (8)	1,529	372 (20)	10,172	2 (2)	98	74 (7)	2,523	514 (40)	12,807	215	7,960	3,125 (211)	92,073
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	1 (2)	60	—	—	—	—	—	—	38	2,946	614 (19)	20,965
—	—	163 (1)	3,125	—	—	—	—	757 (3)	20,670	—	—	—	—	2 (2)	44	54	1,576	1,003 (13)	26,524
—	—	—	—	107 (1)	3,941	—	—	57 (1)	5,611	1,219 (1)	16,591	—	—	551 (2)	5,419	7	724	2,071 (10)	37,276
—	—	73 (3)	2,556	—	—	—	—	2 (1)	150	—	—	—	—	—	—	32	7,101	127 (7)	11,412
—	—	4 (1)	150	—	—	—	—	—	—	—	—	—	—	603 (4)	17,220	182	11,391	1,507 (24)	50,691
—	—	18 (1)	300	—	—	21 (1)	391	—	—	—	—	—	—	11 (6)	309	29	1,566	286 (25)	11,296
90 (1)	4,656	—	—	250 (2)	14,656	—	—	495 (3)	10,785	—	—	—	—	828 (4)	36,917	576	24,228	3,381 (45)	148,582
—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 (1)	102	28	2,550	85 (4)	4,029
—	—	315 (2)	18,933	—	—	—	—	—	—	594 (1)	8,507	—	—	68 (1)	4,738	304	16,595	1,975 (19)	83,378
—	—	—	—	—	—	—	—	515 (2)	12,874	—	—	—	—	296 (4)	19,241	22	3,771	2,657 (25)	111,529
—	—	248 (7)	11,576	88 (2)	9,342	1 (1)	42	9 (4)	170	—	—	9 (1)	157	226 (9)	8,776	273	12,676	2,199 (56)	83,548
120 (1)	8,815	243 (10)	13,268	—	—	353 (12)	8,535	3,659 (173)	106,833	32 (3)	853	163 (11)	4,584	1,263 (31)	33,033	319	11,203	8,816 (406)	315,904
321 (5)	22,394	3,165 (70)	137,312	467 (6)	28,527	1,112 (38)	25,247	11,337 (309)	293,245	2,013 (39)	30,969	681 (31)	18,608	7,087 (236)	244,837	3,522	169,153	51,780 (1,628)	1,783,076
—	—	−105 (—)	−5,315	—	—	+317 (+6)	+13209	+4790 (+8)	+106615	—	—	—	—	+399 (+6)	+13646	−3360	−76247	—	
—	—	—	+535	—	—	—	—	+561 (+4)	+11525	+10 (+4)	—	—	—	−47 (−3)	−301	+14	+883	—	

Figures in parentheses denote number of machines. * Not including machine tool cutting parts

and Parts during August, 1958

Other Lathes		Milling Machines		Planing, Shaping and Slotting Machines		Presses and Sheet Metal-working Machines		Other Machines		Machine Tool Parts*		Total	
Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt.	Value £	Quantity. Cwt. and No.	Value £
2 (5)	497	703 (22)	39,570	63 (6)	1,162	1,017 (13)	41,525	1,561 (87)	74,092	3,019	180,936	9,029 (180)	474,944
—	—	—	—	—	—	34 (1)	1,223	188 (4)	6,025	15	1,060	303 (7)	12,742
—	—	209 (4)	12,667	—	—	167 (1)	9,012	23 (3)	1,097	53	6,957	669 (12)	42,126
—	—	220 (4)	11,034	—	—	537 (2)	17,537	751 (7)	53,766	168	17,477	2,982 (47)	196,698
60 (2)	6,389	87 (2)	15,448	—	—	— (2)	65	232 (4)	47,320	447	66,081	1,897 (24)	228,761
99 (5)	2,751	239 (11)	9,805	—	—	162 (4)	4,270	1,615 (17)	62,303	165	12,798	4,790 (72)	159,182
161 (12)	9,637	1,458 (43)	88,524	63 (6)	1,162	1,917 (23)	73,632	4,370(122)	244,603	3,867	285,309	19,670(342)	1,114,453
—	—	—	—	—	—	—	—	—	—	+1	+83	—	—
—	—	—	—	—	—	—	—	−1(−60)	−443	—	—	—	—
—	—	—	—	— (−2)	−20	—	—	—	—	−2	+17	—	—
—	—	—	—	—	—	—	—	−7 (−3)	−947	—	—	—	—

Figures in parentheses denote number of machines. * Not including machine tool cutting parts.

Machine Tool Share Market

Stock markets, which had been very firm and active under the influence of a reduction in Bank Rate from 4½ to 4 per cent, became depressed following a sharp setback in prices on Wall Street, and the period under review closed on a subdued note, with declines in many sections.

In the gilt-edged section, after some strength had been displayed, a reactionary tendency developed, but the tone hardened again towards the finish.

Early cheerfulness in commercial and industrial share markets was followed by more subdued conditions, and most price changes were to lower levels, on balance.

Among machine tool issues Butler Machine Tool advanced 2s. to 10s.; Coventry Gauge & Tool, 1s. to 18s.; Clarkson Engineers, 3d. to 15s. 6d.; Greenwood & Batley, 2s. 6d. to 55s.; Kayser Ellison, 6d. to 47s.; Sheffield Twist Drill, 6d. to 14s.; Kitchen & Wade, 2s. to 11s. 3d.; F. Pratt, 1s. to 23s. 9d.; and Thos. W. Ward, 1s. 1½d. to 81s. 10½d. On the other hand, Arnott & Harrison lost 6d. at 15s.; Asquith Machine Tool, 6d. at 23s. 9d.; Broom & Wade, 6d. at 11s. 6d.; Churchill Machine Tool, 6d. at 17s. 9d.; British Oxygen, 3s. at 42s.; Chas. Churchill, 1½d. at 6s. 7½d.; Geo. Cohen, 3d. at 10s. 3d.; B. Elliott, 3d. at 2s. 9d.; Newall Engineering, 3d. at 4s. 6d.; and Craven Bros. (Manchester), 4½d. at 8s.

BUTLER MACHINE TOOL CO., LTD. Dividend 17½ per cent for the year ended September 30, last.

CHARLES CHURCHILL & CO., LTD. Interim dividend 7½ per cent (sale).

JOHN HARPER & CO., LTD. Interim dividend 10 per cent (same).

JOHN HOLROYD & CO., LTD. Dividend 15 per cent for the year to September 30, last (same).

KENDALL & GENT, LTD. Final dividend 10 per cent, plus a bonus of 5 per cent, making, with the interim, a total distribution of 20 per cent (same).

SHEFFIELD TWIST DRILL & STEEL CO., LTD. Interim dividend 6¼ per cent.

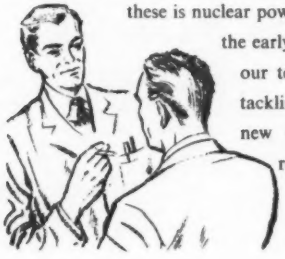
THE MANCHESTER COLLEGE OF SCIENCE AND TECHNOLOGY, Manchester, 1, will hold a course of eight lectures on the "Presentation of Technical Information" on Tuesdays and Wednesdays (7.0 to 9.0 p.m.), starting on February 17. Application forms can be obtained from The Registrar, at the above address. There will also be a course of six lectures on "Circuit Elements and Their Use in Electrical Measurements" on Wednesdays (7.0 to 9.0 p.m.), starting on January 14.

COMPANY		Denom.	Middle Price
Abwood Machine Tools, Ltd.	Ord.	1/-	9d.
Armstrongs, Stevens & Son, Ltd.	Ord.	5/-	8/9
Allen (Edgar) & Co., Ltd.	Ord.	£1	38/-
" "	5% Prf.	£1	15/6*
Arnott & Harrison, Ltd.	Ord.	4/-	15/-
Asquith Machine Tool Corp., Ltd.	Ord.	5/-	23/9
" " "	6% Cum. Prf.	£1	18/6xd
Birmingham Small Arms Co., Ltd.	Ord.	£1	35/ xd
" " "	5% Cum. "A" Prf.	£1	15/6
" " "	6% Cum. "B" Prf.	£1	18/-
" "	4% 1st Mort. Deb.	Stk.	88½
British Oxygen Co., Ltd.	Ord.	£1	42/-
" " "	6½% Cum. Prf.	£1	21/9xd
Brooke Tool Manufacturing Co., Ltd.	Ord.	5/-	4/-
Broom & Wade, Ltd.	Ord.	5/-	11/6
" "	6% Cum. Prf.	£1	17/9
Brown (David) Corporation Ltd.	5½% Cum. Prf.	£1	15/6xd
Buck & Hickman, Ltd.	6% Cum. Prf.	£1	17/9
Butler Machine Tools Co., Ltd.	Ord.	5/-	10/-
" " "	5% Cum. Prf.	£1	13/9
C.V.A. Jigs, Moulds & Tools, Ltd.	5½% Red. Cum. Prf.	£1	11/3
Churchill (Charles) & Co., Ltd.	Ord	2/-	6/7½
" " "	6% Cum. Prf.	£1	26/4½
Churchill Machine Tool Co., Ltd.	Ord.	5/-	17/9
" " "	6% Cum. Prf.	£1	18/3
Clarkson (Engrs.), Ltd.	Ord.	5/-	15/6
Cohen (George), Son & Co., Ltd.	Ord.	5/-	10/3
" " "	4½% Cum. Prf.	£1	14/6
Coventry Gauge & Tool Co., Ltd.	Ord.	10/-	18/-
" " "	5% Cum. Red. Prf.	£1	16/3
Coventry Machine Tool Works, Ltd.	Ord.	4/-	8/6
Craven Bros. (Manchester), Ltd.	Ord.	5/-	8/-
Elliott (B.) & Co., Ltd.	Ord.	1/-	2/9
" "	4½% Red. Cum. Prf.	£1	13/9
Expert Tool & Case Hardening Co., Ltd.	Ord.	2/-	1/3
Firth Brown Tools, Ltd.	4% Cum. Prf.	£1	12/6
Greenwood & Batley, Ltd.	Ord.	£1	55/-
Harper (John) & Co., Ltd.	Ord.	5/-	16/6
" "	4½% Red. Cum. Prf.	£1	13/-
Herbert (Alfred), Ltd.	Ord.	£1	37/6
Holroyd (John) & Co. Ltd.	"A" Ord.	5/-	13/6xd
" " "	"B" Ord.	5/-	13/6xd
Jones (A. A.) & Shipman, Ltd.	Ord.	5/-	21/-
" " "	7% Cum. Prf.	5/-	5/-
Kayser, Ellison & Co., Ltd.	Ord.	£1	47/-
" " "	6% Cum. Prf.	£1	18/3
Kendall & Gent, Ltd.	Ord.	5/-	7/-
Kerry's (Gt. Britain), Ltd.	Ord.	5/-	6/10½
Kitchen & Wade, Ltd.	Ord.	4/-	11/3
Martin Bros. (Machinery), Ltd.	Ord.	2/-	1/6
Massey, B. & S., Ltd.	Ord.	5/-	9/9
Modern Engineering Machine Tools Ltd.	Ord.	5/-	10/9
Newall Engineering Co., Ltd.	Ord.	2/-	4/6
Newman Industries, Ltd.	Ord.	2/-	2/9
" "	6% Prf. Ord.	5/-	5/6
Noble & Lund, Ltd.	Ord.	2/-	3/9
Osborn (Samuel) & Co., Ltd.	Ord.	5/-	20/-xd
" " "	5½% Cum. Prf.	£1	26/-
Pratt (F.) & Co., Ltd.	Ord.	5/-	23/9
Scottish Machine Tool Corporation, Ltd.	Ord.	4/-	5/3xd
Shardlow (Ambrose) & Co., Ltd.	Ord.	£1	44/6
Shaw (John) & Sons, Wolverhampton, Ltd.	Ord.	5/-	14/6
Sheffield Twist Drill & Steel Co., Ltd.	Ord.	4/-	14/-xd
" " "	5% Cum. Prf.	£1	15/-
Stedall & Co., Ltd.	Ord.	5/-	7/6
Sykes (W. E.), Ltd.	"B" non-voting Ord.	10/-	22/6
Tap & Die Corporation, Ltd.	Ord.	5/-	7/6
" " "	4½% Deb. 1961-1977	Stk.	82/-
Wadkin, Ltd.	Ord.	10/-	18/9
Ward (Thos. W.), Ltd.	Ord.	£1	81/10½
" "	5% Cum. 1st Prf.	£1	16/6
"	5% Cum. 2nd Prf.	£1	24/-
Willson Lathes, Ltd.	Ord.	1/-	2/4½

The Middle Prices given in the list are in several cases nominal prices only and not actual dealing prices. Every effort is made to ensure accuracy, but no liability can be accepted for any error. * Sheffield price. † Birmingham price.

Have Ransome and Marles been associated with any of the big developments in British industry?

We don't hit the headlines — but we often help to make headline news possible. Since the war we have carried out research into design, materials, lubrication and production for a number of important projects. One of these is nuclear power generation. From the early days of Calder Hall our technicians have been tackling fresh problems as new and more powerful reactors are designed.



Are there any other interesting projects?

Yes, several. Britain has been achieving a world-wide success with her aircraft engines. Two notable users of R&M Bearings are Armstrong-Siddeley Motors and Bristol Aero Engines. The Proteus engines of the latest Bristol Britannia are of course fitted with R&M Bearings.

Then again "automation" is a popular word these days. We at R&M are becoming increasingly "automatic" in many of our processes in shops and offices. We also supply the bearings for the latest electronic machines. Our customers include Powers Samas, Elliott Brothers, IBM and British Tabulating Machines — just another example of the role played by R&M in all fields of industrial development.

BALL & ROLLER R&M BEARINGS

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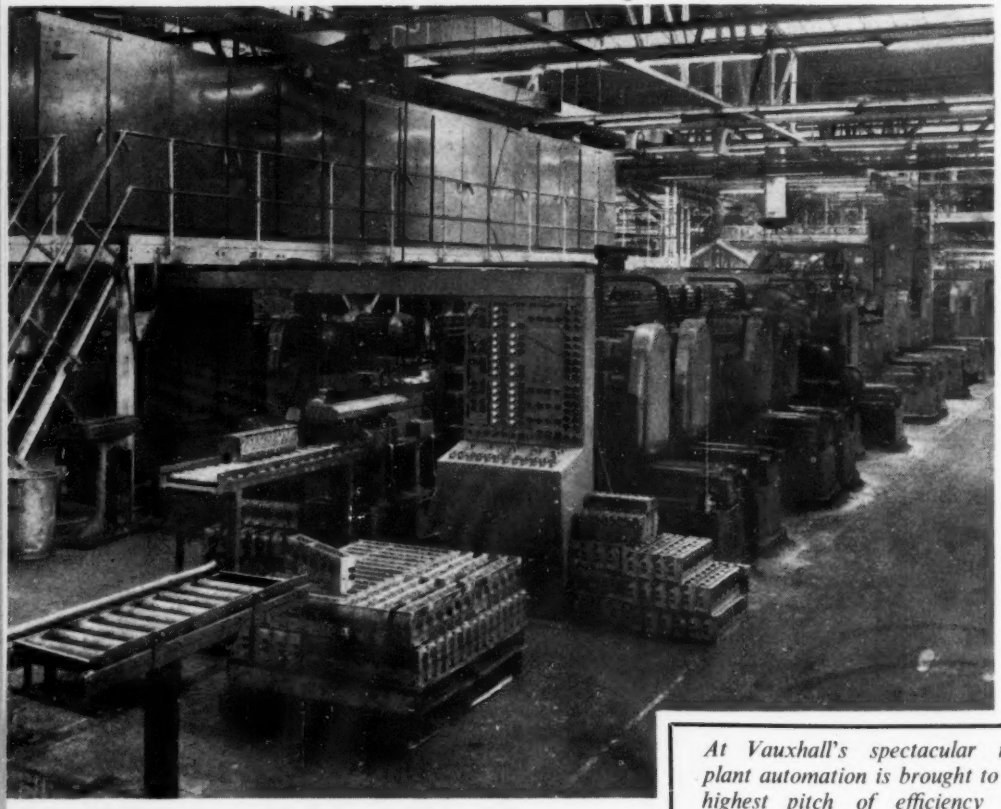
Automation at Vauxhall Motors



At Vauxhall's spectacular new plant automation is brought to the highest pitch of efficiency yet achieved. Pictured is the Asquith 18-station Drilling Transfer Machine used for machining all Vauxhall Victor, Velox and Cresta cylinder heads. With a total of 273 spindles it absorbs 269 H.P., cycling at 70 pieces/hr. performing all drilling, reaming, countersinking, boring and tapping operations. The sequence of all the fixtures, transfer bar, tilting and turning stations is actuated by VICKERS-DETROIT *Oil Hydraulic Equipment.*

For further details please write for publication 1/39

As in the many other fields of industrial production where continuous processes are called for VICKERS-DETROIT Oil Hydraulics are specified by the largest organisations to reduce cost, improve uniformity and provide flexibility— advantages which are at the service of every industrialist, whatever the size of plant.

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OIL HYDRAULICS

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Electrical Aids in Industry

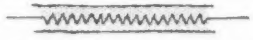
Data Sheet **No. 4**

Resistance Heating – 1

In this form of heating, the heat is produced by passing an electric current through a high resistance conductor which is termed the "heating element".

The heat is transferred from the heating element to the work by convection, radiation or conduction or by a combination of any, or all, of these. When it is a question of radiation or convection, the element can be a bare wire or strip of suitable material, provided it is adequately supported on electrical insulation capable of withstanding the temperature.

When there is to be contact between the work and the element, heat being transferred to the work by conduction, the wire or strip must be surrounded by suitable insulating material and enclosed in a protective sheath.



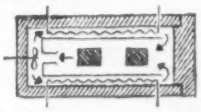
In the majority of cases, the wire or strip forming the heating element is made of a nickel-chromium alloy which has a high electrical resistance and can be safely used in air at temperatures of up to 1050°C., or in a suitable atmosphere, of up to 1150°C. Other element materials are available for use at higher temperatures.

Electric resistance heating may profitably be put to many diverse uses; two of these are described briefly below, others will be listed in a subsequent data sheet.

Furnace Heating

Electric resistance furnaces can be divided into two main categories, batch type and continuous. In most cases, the heating elements are of nickel-chromium alloy, for furnace temperatures up to around 1050°C., but higher temperatures, up to nearly 3000°C., can be obtained by using other metals or alloys, or in some cases non-metallic elements. A protective atmosphere is desirable to prolong the life of some of these higher-temperature elements. For all temperatures, electric resistance furnaces can be constructed so that the heating process takes place in a controlled atmosphere if this is dictated by the composition or heat requirements of the work charge. In some furnaces, fans are used to circulate the air or special atmosphere over the charge, thereby giving increased heating rates and a uniform temperature over the whole charge.

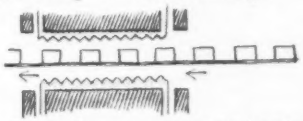
Automatic temperature control and programme control of the heating process are readily effected.



Electric furnaces are extensively used in industry, for example in the general heat treatment of metals, in the glass and ceramics industries, for brazing and sintering, and for many other applications requiring temperatures above 500°C.

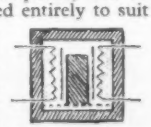
Oven Heating

There are two basic forms of heat transfer used in electric resistance ovens; convection and radiation. The latter is dealt with in a separate data sheet under the heading "Infra-Red Heating".



Convection ovens may again be of the batch or continuous type. In either case, the charge is heated mainly by the movement of hot air, which is sometimes assisted, as in furnaces, by fans to give a rapid and uniform temperature rise. Ovens are normally designed for temperatures of up to about 500°C., and the heating elements are invariably of nickel-chromium or nickel-chromium-iron alloy.

Ventilation, when required, can be provided and regulated entirely to suit the heating process. Temperatures and times are readily controlled. A vacuum can be maintained in suitably designed ovens to assist in the extraction of moisture and solvent.



Convection ovens are extensively used for drying, baking and stoving operations, and for a host of other processes requiring a low or medium temperature.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, W.C.2.

Excellent reference books on electricity and productivity (8/6 each, or 9/- post free) are available—"Induction and Dielectric Heating" is an example; "Resistance Heating" is another.

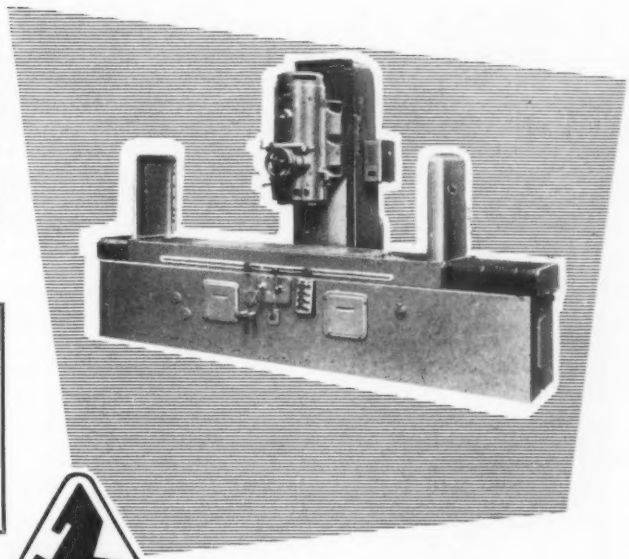
E.D.A. also have available on free loan a series of films on the industrial use of electricity. Ask for a catalogue.

6780/4

In stock now

VERTICAL SPINDLE SURFACE GRINDER

A machine specially built for rough or precision grinding of continuous and interrupted plane surfaces. For hollow grinding the head can be tilted out of its horizontal position. During grinding, the entire working width of the table can be covered simultaneously by a segmental grinding wheel.



Type BPV 300/1500
£1,935*

	BPV300		BPV700	
	1000*	1500*	2000	3000*
	(inches)	(inches)	(inches)	(inches)
Working surface of table	11¾×39⅜	11¾×59	23½×78¾	23½×118
Maximum width, ground	11¾	11¾	23½	23½
Longitudinal travel of table	54½	80½	95	154
Main Spindle drive, h.p.	20	20	30	30

* From stock, subject to prior sale.

TOS

Versatile and compact

CENTRELESS GRINDER TYPE BBZ60

For the high precision grinding of plain cylindrical, shouldered and tapered parts, as well as parts of more intricate shape.

Soft or hardened steel can be handled and with a suitable grinding wheel practically all other materials, including brass, copper, aluminium, glass and plastics.

The machine can be operated by unskilled labour.

Price, £1,250 from stock

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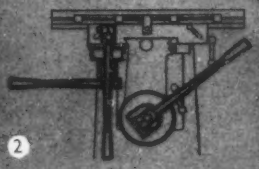
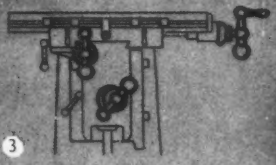
MODEL '1' HORIZONTAL MILLER

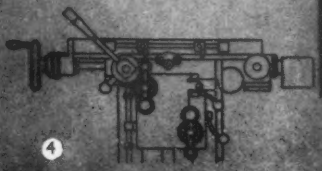
1 Hand Feed—lever, screw, lever.



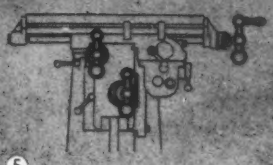
2 Hand Feed—lever, lever, lever.



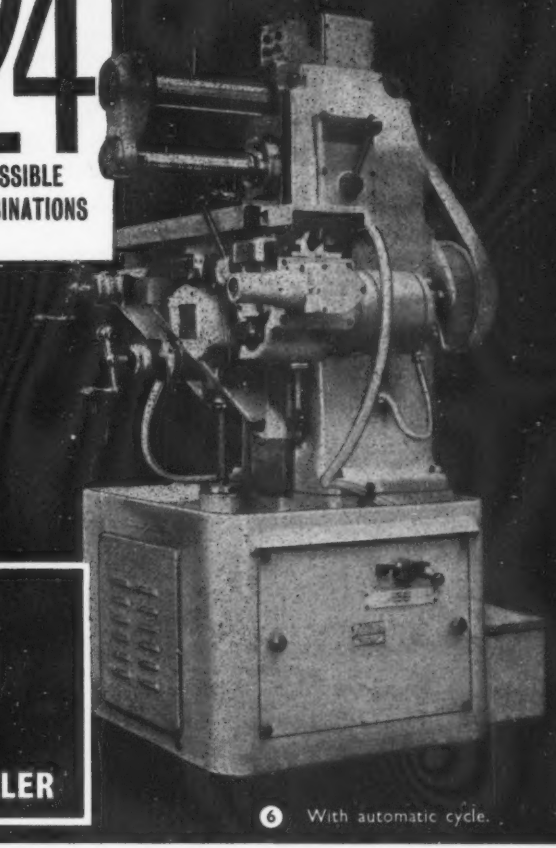
3 Hand Feed—Screw, screw, screw.



4 Multiform—semi-automatic cycle.



5 Normal automatic feed.



6 With automatic cycle.

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TABLE 26" x 7"
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VERTICAL TRAVERSE = 10"
TRANSVERSE TRAVERSE = 5½"-6"

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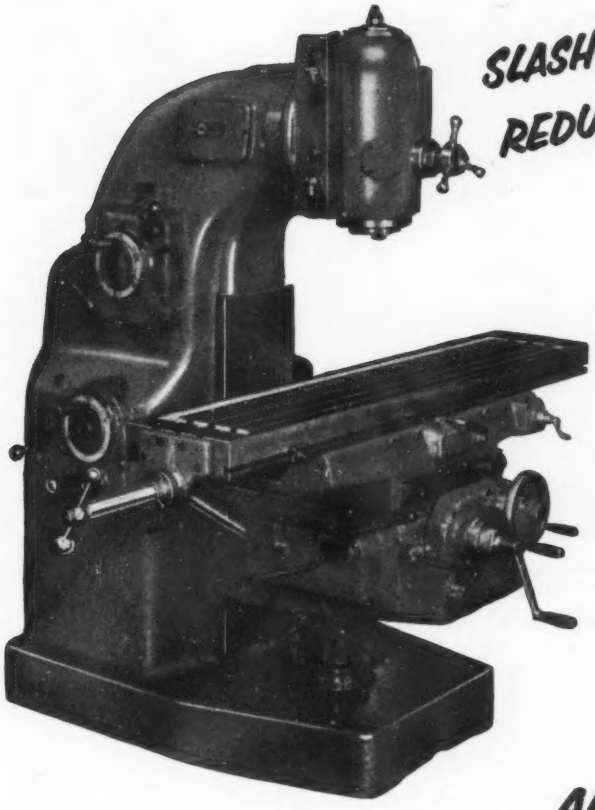

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- ★ Schlesinger limits.

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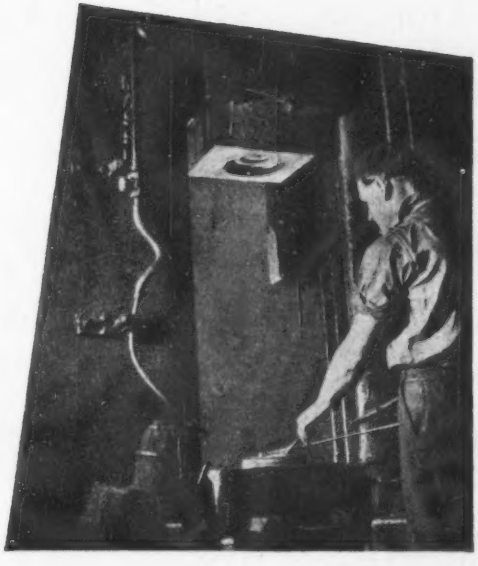

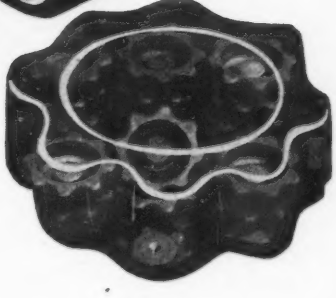

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Yate Company announces new projects

MACHINE TOOL STOCK ROOM FOR LONDON

Continental and English machines on show

Newman Industries Limited of Yate, Bristol, have announced the opening of a new London stockroom. Situated in Monkton Street, Kennington, the building is within easy reach of Kennington and Lambeth North underground stations.

Eventually Newman will have on display at this stockroom a representative range of all the new machine tools for which they hold selling rights in the U.K. Already on show are an MVE Centre Lathe, TOS Vertical Spindle Surface Grinder and Centreless Grinder, a TECHNOIMPEX Milling, Machine, a PFEIFER Horizontal Borer and HEID Copying Lathe, Planer Drive and Clutches. It is hoped that a ROCCO Horizontal Boring Machine from Italy will shortly be on show.

Anyone requiring fuller information or wishing to view these machines should contact Newman at their London Office. Telephone Sloane 8206.

Newman FOR MACHINE TOOLS

ROCCO FOR NEWMAN

The Italian machine tool manufacturers ROCCO have given sole selling rights in this country to Newman Industries Limited.

It was announced from the Machine Tool Division that the ROCCO Horizontal Boring and Milling Machine, a big success at this year's Milan Fair, should prove just as popular in Britain.

STOP PRESS

MITCHELLS of Keighley have appointed Newman one of their U.K. Distributors for their range of centre lathes.

The first ROCCO machine to be imported, Type AL76 (3in. Spindle) sells at £5,250 inclusive of import duty. The machine has, as standard equipment an 18in. facing head; universal milling attachment and arbor support (which can be used for vertical milling); high precision scales; adjustable verniers; dial indicators for vertical and horizontal traverses and screwcutting. Many other attachments are available as extras. The machine has an indexing table of 48in. by 36in. and spindle speeds up to 1,500 r.p.m.

Complete Rebuilding Service

There is still some capacity for rebuilding at Yate where over 40,000 square feet of floor space is set aside for this purpose. Machines are rebuilt to Schlesinger limits and guaranteed for six months. Typical detailed planning sheets showing how each rebuild is planned down to the last nut and bolt may be obtained on application to the Newman Head Office at Yate.

Quarter of a million miles by car

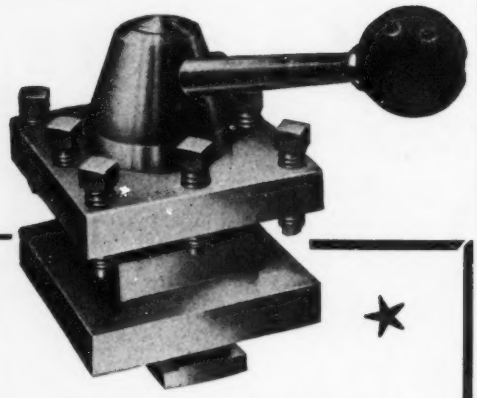
This year technical representatives of the Newman Machine Tool Division have travelled nearly a quarter of a million miles buying and selling new and secondhand machine tools. This figure excludes air and rail travel and journeys abroad to the various continental manufacturers for whom Newman are sole agents. It is expected that the present boom in production will mean a bigger mileage than ever in 1959.

BETTER INFORMATION SERVICE

In the belief that engineers today have a morning mail overloaded with often quite irrelevant material, Newman Industries have adopted a system which will reduce this irritation.

The Company has sent out a prepaid postcard to a large number of Machine Tool buyers, listing 25 classifications of new and secondhand machinery and asking that the recipient should tick only those classifications in which he may be interested. The information gathered will enable Newman to circularise details o tools and services more quicklyf and selectively than was before possible.

Companies who have not received a card and wish to be placed on the mailing list are invited to write to Newman Industries Limited, Yate, Bristol **now.**



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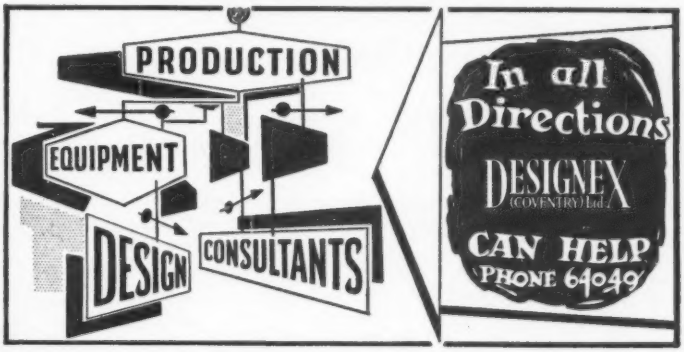

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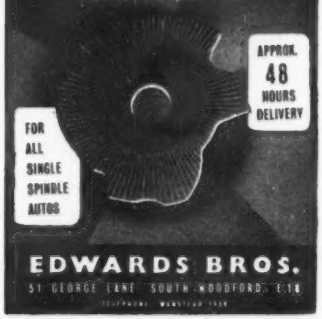

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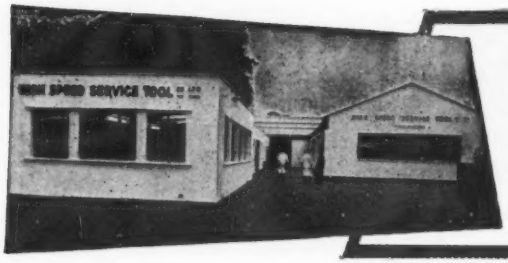

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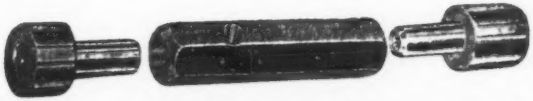

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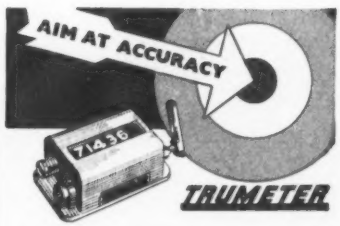

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URQUHART

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LATHES

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PRESSES (Power)
BLISS No. 8.
BESCO TVO Bench, 4 ton.
O. & S. 30 tons Straightening.
BESCO EB4, 40 tons. New.
TAYLOR & CHALLEN 82. 10 tons.
RHODES No. 19. 10 tons.
SCHULER VZZ, 15 tons d/s gripper feed.

RIVETERS
HIGHSPEED Hammer 4A. ⅞in.
ROTORIVET No. 5 Hammer.
TURNER ⅛in. RS2A Spinning.

SCREWING MACHINES
OSTER 1in.-6in. Pipes No. 326.
ATLAS No. 2, 3in.-6in. (Unused)

SHAPERS
ANCO 6in. Precision.
24in. ROCKFORD Hyd.

TAPPERS
HERKE ⅜ Bench.
HERBERT No. 2 Flash.
SUPERIOR ½in.
JONES No. 26. 2 B.A.-½in
THIEL Nos. 3 and 4.
J. & S. Electrotap, ½in.

THREAD MILLERS
FACKS Plain, cap. 3in. × ⅜in.
LEES BRADNER Mod. 40. 6½in. H.M.
HANSON WHITNEY, 8in. × 40in.

No. 2 Kearns Standard Motorised Hor. Boring and Facing Machine. Will face up to 30in. dia. 24 spindle speeds. Main table 48in. × 30in. Top table 36in × 36in. Balanced head. Covered ways. Vernier fitted. Facing head to outer steady 5ft. A.C. motor.—LEE & HUNT, LTD., Crocus Street, Nottingham. Tel.: 84246.

WARD No. 7 Combination Turret Lathe: A.C. motor drive. Covered bed. With automatic ball chuck, bar feed, front and back toolpost.

HERBERT No. 9S Combination Turret Lathe. A.C. motor drive, 4¼in. H.S. Very well equipped with chucks, toolholders, etc.

NOBLE & LUND 11/16 "Fluifeed" Cold Saw. Capacity 5in. diameter. A.C. motor drive.

4/6, Minerva Road, Park Royal, LONDON, N.W.10.
Telephone: ELGar 4841-4842.

Asquith Model OD1, 4ft. 6in. Radial Arm Drill, No. 5 M.T. 2-motor type. £480.—A. McNAMARA & CO., New Line, Bacup, Lancs. 'Phone: Bacup 946.

ROBEY SMITH No. 2 12in. Bevel Gear Planing Machine, with all equipment. Modern tool. Motor-driven 400/3/50.

PARKES (MACHINE TOOLS) LTD.
WITTON ROAD, BIRMINGHAM, 6.
Tel.: EASt 1742

Westminster Type C Single Ended Scaling Machine for sale. Motorised machine for cleaning the edge of sheet metal prior to resistance welding. Sheets of any length can be passed through the machine. Scaling speed approximately 40/45ft. per minute. Size of table 3½in. wide × 54in. long.—Photo, etc., from F. J. EDWARDS LIMITED, 359-361, Euston Road, London, N.W.1, or 41, Water Street, Birmingham, 3.

1—(Type E1QA), 2 kVA Delapena. Induction Heater, together with automatic control panel.
1—(Type E0) Ditto.
3—(Type W12A) 6 kVA Delapena Induction Heaters together with automatic control panel.
1—(Type E14) 10 kVA Delapena Induction Heater without voltage regulator.
BOX Z771, MACHINERY, Clifton House, Euston Road, N.W.1.

Compressors and Motors For Sale. Two only, 1,440 r.p.m. Brush Induction Motors complete with starters, etc. Two only Reavell Two Stage HCSA6 Type H.P. Compressors, delivery 37 cu. ft. per min. at 720 r.p.m. Fifteen only Air Storage Bottles, 4ft. × 8in. dia. Reasonable price accepted for quick sale.—Apply: PENDRY (PLASTICS), LTD., Bridge Works, Brentfield Road, N.W.10.

J. W. LITHERLAND
(MACHINE TOOLS) LTD.,
98, Brunswick Road, London, W.5.,
Perivale 1831.

CONOMATICS
Becoming available Jan. 1st, 4 only, 4 spindle 2in. cap. Bar Automatics. Complete Bar Feed, motor 400/3/50. Equipped. Machines still working, and may be inspected under power. 1939-40 machines, reconditioned 1951.

Asquith H.K.1 Horizontal Duplex Keyseater, serial S1433, table w/s 32in. × 7in., maximum keyway cut with autocrank at one setting 1in. × 6in. through 3in., six table speeds, auto feed to depth at each end of table stroke, spindle speeds 400 to 1,200 r.p.m., self-contained motor-driven machine 400/3/50, in good condition, £150.—E. SMITH (MACHINE TOOLS), LTD., 76, St. Lukes Road, Birmingham, 5. Tel.: CALthorpe 3761.

Manlove Alliott Mot. Oil Separator, 20in. bowl, foot brake, good condition. 400/3/50.—C. L. THOMAS, LTD., 18, Park Avenue, Solihull 1281.

Pollard 4 Spindle Driller. Ind. Mot. No. 2 M.T. Heads mounted radially at 90 deg. Auto feeds.—WILCOX & CO., Barr Street, Birmingham, 19. Northern 1234/5

When answering advertisements kindly mention MACHINERY.

Classified Advertisements (*PLANT FOR SALE, contd.*)

RING BELLS for machine tools

LEEDS 63-7398

CHURCHILL 24in. by 36in. Cylindrical Grinder. Dia. of work admitted 24in. by 36in. length. Hydraulic table feeds. Grinding wheel size 20in. dia. by 2in. face. M.D. 400/3/50.

HERBERT 33 Plain Miller. Table 38½in. by 10½in. Speeds 37 to 400 r.p.m. M.D. 400/3/50.

LECRA 18 ND Inclinable Press. Cap. 10 tons. Stroke 1½in. With strip feed. M.D. 400/3/50.

KANE & ROACH Model No. 1A Section Straightening Machine. Estimated cap. 1½in. dia. rounds in M.S. M.D. 400/3/50.

CLIFTON & BAIRD 24in. Automatic Cold Saw. Admits 24in. blades to cut 8in. rounds. Hydraulic clamping. Automatic hydraulic infeed for continuous cutting. M.D. 400/3/50.

OLIVER Quickwork Rotary Shear. Throat 30in. Cap. 12's gauge. M.D. 400/3/50.

OHIO 32in. Heavy Duty Dreadnought Crank Shaper. V-belt drive from 10 h.p. motor 440/3/50.

KENDALL & GENT Model 6-3 Screwing Machine. Cap. ¼in. to 3in. bolts and 1in. to 6in. tubes. Tangential die head. M.D. 400/3/50.

RHODES No. 20 Ungeared Inclinable Power Press. Built 1955. Cap. 18 tons. Stroke ¼in. to 3½in. M.D. 400/3/50.

Planing Machine, 10ft. by 3ft. by 3ft. Table 10ft. by 2ft. Rack driven. M.D. 400/3/50.

EDWARDS Nibbling Machine. Pedestal mounted. Throat 11in. Estimated cap. ¼in. in M.S. M.D. 400/3/50.

MILWAUKEE 2H Vertical Miller. Table 50in. by 10in. Long traverse 28in. Rapid power three ways. 16 speeds 35 to 1,400 r.p.m. M.D. 400/3/50.

HERBERT 1SS Vertical Miller. Table 41in. by 10¾in. Long traverse 30in. Eight speeds 51 to 700 r.p.m. M.D. 400/3/50.

ASQUITH Model LDP and HDP two-spindle profile Millers. Table 18in. by 15in. Speeds 250 to 3,000 r.p.m. M.D. 400/3/50.

FRITZ WERNER Model 2202 Plain Horizontal Miller. Table 63in. by 14¼in. Quick power all ways. Speeds 19 to 960 r.p.m. M.D. 415/3/50.

DARLING & SELLARS 6A Combination Turret Lathe with plain bed. Speeds 750 r.p.m. Spindle bore 2¼in. M.D. 400/3/50.

HERBERT No. 4 Chucking Capstan. Speeds to 1,000 r.p.m. Built 1946. Reconditioned. M.D. 400/3/50.

JONES & SHIPMAN Duplex Horizontal Keyway Cutting Machine. (Slot Hydro-mill.) Table 53in. by 10½in. with variable hydraulic traverses. Keyways cut up to 12in. long and 1in. wide. M.D. 220-440/3/50.

HURTH Type LF Keyseater. Table 40½in. by 10½in. Max. stroke of cutter head 6¾in. Five speeds 250 to 1,000 r.p.m. M.D. 400/3/50.

JONES & SHIPMAN Fig. 310 Tool and Cutter Grinder. Cap. 8in. by 16in., with elevating and swivelling wheelhead, internal spindle, universal cutter head, chuck, etc. M.D. 400/3/50.

PRECIMAX M.P.L. 6/36 Hydraulic Plain Grinder. Max. wheel size 20in. dia. by 4in. face. Plunge feed to wheelhead. M.D. 400/3/50.

TAYLOR No. 2 Cutting-off Machine. Rotary tool type. For bars up to 4½in. dia. and tubes up to 6in. dia. max. M.D. 400/3/50.

KENDALL & GENT No. 3 Horizontal Broaching Machine. Screw operated. 20-ton pull. Max. stroke 50in. M.D. 400/3/50.

PETERMANN P.4 Single Spindle Automatic. Capacity ⅝in., with bar feed equipment. Electrics 220-380/3/50.

H. BELL (Machine Tools) LTD., Walter Street, LEEDS 4.

TAYLOR & CHALLEN 808 200-ton Power Press, 26in. between columns, area of bed 36in. × 26in., 3in. stroke.

PARKES (MACHINE TOOLS) LTD.

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Tel.: EASt 1742.

Archdale 28in. Horizontal Miller with vertical Attachment. 400/3/50.—HICKS MACHINERY, LTD., 26, Addison Place, London, W.11. Tel.: PARk 2333.

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FROM STOCK

KEARNS No. 5 Patent type, 5in. spindle covered bed, main table 48in. × 84in. Verniers.

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KEARNS No. 3 Patent type, 3½in. spindle, covered bed, table 32in. × 60in., verniers, screwcutting.

RICHARDS HB.2 2¾in. spindle, table 39in. × 30in., verniers, screwcutting; fully reconditioned.

PEARN RICHARDS No. 4 standard type, facing head only, table 60in. × 36in.; older machine but in good condition.

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We specialise in rebuilding the heavier types of machine tools and would welcome your enquiries.

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'Phone: RELiance 7201.
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Richards No. 2 Horizontal Boring and Facing Machine, 400/3/50. £400.—A. McNAMARA & CO., New Line, Bacup, Lancs. 'Phone: Bacup 946.

Robot 6in. × 18in. Horizontal Spindle Surface Grinder, auto traverse, self-contained mahine, 400/3/50, complete with dust extractor and magnetic chuck, excellent condition, £250.—E. SMITH (MACHINE TOOLS), LTD., 76, St. Luke's Road, Birmingham 5. Tel.: CALthorpe 3761.

Ravensburg Surfacing and Bor- ing Lathe with Electronic-Hydraulic copying, model K.45. Maximum swing 57in., 12 speeds, 8.4 to 380. Copying traverse in one stroke cross 19¾in., copying traverse in one stroke longitudinal 13¾in. Used 20 months only.—FIT LTD., Harpenden.

Kearns No. 2A Horizontal Borer. 30in. Quartering Table. 18in. Springfield Boring, Surfacing Lathe, approx. 1940 machines. Seen working.—10, Whitehall Lane, Slade Green, Kent.

Ward 3A B/f. B/c. No. 7 Spindle. 5 years old.
Ward 2C. B/f. B/c. No. 3 spindle, 1957.
Lodge & Shipley Lathe. 30in. × 14in. swing. A.G.H. Motorised all 3 phase, space needed quickly. Offers.—Redhill 3478.

No. 3U "Adcock & Shipley" motorised all-geared Universal Milling Machine. Table 50in. by 12in., has longl. travel of 30in. Spindle speeds 20-1,400 r.p.m. Auto feed ¼in.-50in. per min. all movements. Rapid traverse by separate motor. Good equipment. Post war machine.—LEE & HUNT, LTD., Crocus Street, Nottingham. Tel.: 84246.

Friction Screw Presses, 75 Ton and 100 ton for sale.—ALAN-MARKOVITS LTD., Emblem House, Sussex Road, Hove. Tel. Hove 30003.

B.S.A. Automatics, ⅝in. Cap. long stroke, 2 available, one third slide Good condition. £450 the pair.—C. L. THOMAS, LTD., 18, Park Avenue, Solihull 1281.

Ward 2A, 1¼in. Bar Capstan Lathe. 400/3/50. Also Chucking Machine with raised centres. S.P.D.—HICKS MACHINERY, LTD., 26, Addison Place, London, W.11. Tel.: PARk 2333.

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HORDEN, MASON & EDWARDS LM100 Geared, Open Front Power Press. 100 ton pressure, adj. stroke 1in.-6in., bed area 40in. × 33in., throat 13in., air balanced slide. 400/3/50.

RHODES Type 6½-26 Double Sided Geared Power Press, 150 ton pressure, 18in. stroke, bed area 25in. × 37in., hole through bed 16in. × 13in., air operated friction clutch. 400/3/50.

TAYLOR & CHALLEN Type 1449 Double Sided Geared Power Press. 150 ton pressure, 10in. stroke, bed area 32in. × 28in. 400/3/50.

TAYLOR & CHALLEN Size 4½ Toggle Drawing Press, Punch stroke 15in. Largest draw 7½in., largest blank admitted 18in. dia. bed area 24in. × 26in. 400/3/50.

RHODES No. 4½ Double sided Geared Power Press, 250 ton pressure, 2in. stroke, bed area 32in. × 36in., hole through bed 14½in. dia., friction plate air operated clutch. 400/3/50.

RHODES No. 2 Double sided Geared Power Press, 75 ton pressure, 2in. stroke, bed area 26in. × 20in., hole through bed 14½in. × 14½in. 400/3/50. Roll feed attachment available for this machine.

TAYLOR & CHALLEN Size 3½ Drawing Press, Punch stroke 10in., deepest draw 5in., bed area 22in. × 19½in., largest blank admitted 14in. dia. 400/3/50.

RHODES 218 Geared Inclinable Power Press, 60 ton pressure. 3½in. stroke, bed area 30in. × 22in., Centre to back 9in. Tie rods, fully guarded. 400/3/50.

TAYLOR & CHALLEN Type 818 Double Sided Geared Power Press. 200 ton pressure, 8in. stroke, bed area 36in. × 26in., Hole through bed 18in. dia. 400/3/50.

SWEENEY & BLOCKSIDGE No. 12 Open front Geared Power Press. 50 ton pressure, adj. stroke 2in.-5in., bed area 36in. × 22in. Hole through bed 12in. dia. 400/3/40. Fitted mechanical hand device.

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All modern machines, in excellent condition.

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HARRY KIRK

can recommend the following modern quality machines from STOCK:

HARVEY Heavy Duty S.S. & S.C. Lathe 56in. swing × 26ft. between centres S.C.M.D. 34 h.p.
NILES Horizontal Boring, Milling, Drilling and Facing Machine, 4⅞in. dia., sliding spindle 60in. × 50in., revolving table.
KITCHEN & WADE Vertical Hydraulic Honing Machine, capacity 2in. diameter to 9in. diameter × 29in. long.
REED PRENTICE No. 6 Vertical Milling Machine, kneeless type, table 84in. × 20in.
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SCRIVENER No. 2 Centreless Grinding Machine with control cycle.
CHURCHILL Model RBY 24in. Rotary Surface Grinding Machine.
SWIFT 4ft. RADIAL DRILLING MACHINE. Elevating arm, box table.
HERBERT No. 4 Automatic Chucking Lathe.
PARKINSON No. 3J UNIVERSAL MILLING MACHINE.
PRATT & WHITNEY 12in STROKE SLOTTING MACHINE. Tilting ram.
MODERN OPTICAL PROFILE GRINDING MACHINE.
LANG JUNIOR CENTRE LATHE. Capacity 6¼in. centre height by 30in. between centres.
CHURCHILL-REDMAN HEAVY DUTY SHAPING MACHINE, 24in. stroke, swivelling vice, 10 h.p. motor.
BUTLER 8in. STROKE SLOTTING MACHINE, with tilting table.
B.S.A. 9in. SINGLE SPINDLE CHUCKING AUTOMATIC. Complete with air-operated chuck.
KITCHEN & WADE VERTICAL FINE BORING MACHINE. 14in. stroke. Compound table.
KITCHEN & WADE HEAVY DUTY PILLAR DRILL. No. 5 Morse. Speeds 22-1,000 r.p.m.
CHURCHILL 12in. by 36in. UNIVERSAL HYDRAULIC GRINDING MACHINE.
COLLET & ENGLEHARDT HORIZONTAL BORING, MILLING AND DRILLING MACHINE. 3in. Sliding Spindle, size of top table 35in. × 43in.
COLLET & ENGLEHARDT HORIZONTAL BORING, MILLING AND DRILLING MACHINE. 3¼in. Sliding spindle, size of top table 47in. × 40in.
KEARNS O.A. HORIZONTAL MILLING, DRILLING AND TAPPING MACHINE. 2¼ in dia. Sliding spindle, size of top table 24in. × 33in.
ASQUITH O.D. 5ft. RADIAL DRILLING MACHINE.
HARVEY HEAVY DUTY ROLL TURNING LATHE. 72in. swing by 30ft. between centres. S.C.M.D. 80 h.p.

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TWO **B.S.A.** 9in. Chucking Automatics Each with front and rear toolposts, 9in Coventry air chuck, combination toolholders, pick-off gears, etc. Spindle speeds 23 to 945 r.p.m. Motor drive 415/3/50.

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INDEX ON.12 Automatics.
PETERMAN 7 m.m. Automatics.
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GISHOLT No. 4 Capstan.
WARNER & SWASEY No. 2 and No. 5 Capstan.
CARL UNGER Universal Grinder.
PALAS No. 2 Surface Grinder.
NORTON 18in. × 6in. Surface Grinder.
CHURCHILL 'HDY' Internal Grinder.
HEALD 72A Internal Grinder.
WOTAN Internal Grinder.
LANDIS Cutter Grinder.
JACKMAN Disc Grinders, horizontal 48in. and 24in.
PRECIMAX 10in. × 48in. Plain Grinder.
MAXNOVA Profilomatic type 'V' Copying Lathe.
HOLBROOK Model 'C', No. 10 S.S. & S.C. Lathe.
HOLBROOK 8in. × 36in. S.S. & S.C. Lathe.
KARGER 5in. × 24in. S.S. & S.C. Lathe.
GISHOLT No. 5 Turret Lathe.
CINCINNATI 3/36 Hydromatic Duplex Mill.
WADKIN Vertical Mill, 2,100 to 3,100 r.p.m.
CINCINNATI No. 4 Vertical Mill.
ADCOCK & SHIPLEY No. 3 Horizontal Mill.
CINCINNATI Hydrotel Mod. EM. 28in. Vert. Mill.
EDGWICK No. 1 Speedmil.
WERNER type 2201 Plain Mill.
DENBIGH Universal Mill.
VICTORIA Horiz. Mill.
MANN Horiz. Mill type 4102.
VULCAN Mark I Routing Machine.
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Variable Speed 'H' Gear Drives 3 h.p.
All machines motorised 400/3/50 unless otherwise stated.

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Hydraulic Press (Upstroking) for sale. Table 6ft. × 4ft.—6ft. daylight —600 tons pressure at 2 tons per sq. in. £950 ex works.—POLARCOLD LTD., Congleton-Cheshire. Telephone: 2401/2.

WARD 2A and **HERBERT** 2D Capstan Lathes bar machines, modern tools.

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WITTON ROAD, BIRMINGHAM, 6.
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AS NEW MACHINE TOOLS OF SPECIAL INTEREST

PLEASE NOTE PRICES

CINCINNATI No. 2 Vertical Miller, 53in. by 12in., dial type, speeds 20 to 1,500, power and rapid all ways. **£1,050.**

HERBERT No. 2 Carbimil 40in. by 12in. table, suitable for really heavy production work, 1950 machine, hardly used, with standard equipment. **£475.**

CARDIFF 8½in. by 48in. S.S. & S.C. Lathe, 1955 machine, with equipment. **£850.**

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WARD 2A Capstan, power saddle, two-speed motor, equipped as required, 1951 machine. **£375.**

NEWALL plain hydraulic grinder, 10in. by 36in., equipped, war machine, almost unused. **£375.**

SCRIVENER No. 2 Centreless grinder, capacity 6in., very clean. **£350.**

RICHMOND SR2 Radial Drill, 1¼in. cap., 48in. arm, with power elevation and coolant. 1958 machine, used for one week only (new price £720). **£675.**

INVICTA 6MR 24in. Shaper, 1954 machine, showroom condition. **£450.**

8, Clarendon Avenue, Leamington Spa. Telephone 1215

Classified Advertisements (*PLANT FOR SALE contd.*)

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New **BENNIE** 10ft. × ¼in. Combined Plate Bending and Straightening Rolls, top roller 12¼in. dia., bottom rollers 10in. dia., outer or straightening roller 11in. dia.

New **BENTLEY** 250 ton capacity type G/15 Billet Shearing Machine, max. capacity 3¼in. sq. M.S., air-operated clutch, automatic lubrication.

New **PEARSON** 8ft. × ¼in. Electro Hydraulic Guillotine Shearing Machine of steel plate welded construction, 12in. gap in end frames.

New **STECO** 6ft. × ¼in. Pyramid type Plate Bending Rolls, dia. of top roll 8¼in., bottom rolls 7¼in.

Used **BENNIE** All Steel Frame Section Cropping Machine, capacity 6in. × 6in. × ½in. angles at 90 deg. or 4in. × 4in. × ½in. at 45 deg., 1¾in. round bars, 1½in. square bars.

New **HOLLMAN** Oil Hydraulic Bending and Straightening Press, capacity 315 tons, bed area 63in. × 25½in. Ram stroke 19½in.

Used **CRAIG & DONALD** 7½/26 Straight Side Single Crank Geared Press, with 8in. stroke. Distance between columns 26in. Bed area 26in. × 38in.

Used **TAYLOR & CHALLEN** 40 tons capacity Open Front Rigid Power Press with 3in. stroke. Complete with Roll Feed Equipment and 2 speed motor drive.

Used **TAYLOR & CHALLEN** type 370 20 tons capacity Open Front Rigid Power Press with 2in. fixed stroke. Complete with Roll Feed Equipment, arranged for flat belt drive.

New **WEYBRIDGE** MS. 48 Medium type Rotary Gang Slitting Shears, max. capacity 6 cuts in 48in. × ¼in. M.S.

New **BARNES** 6ft. × ¼in. Upstroking Hydraulic Bending Press. Max. stroke 8in. 6in. gap in frames. 73in. between columns. 78in. overall bed.

New **RASKIN** R7 120 tons capacity Open Front Rigid Geared Power Press with adjustable stroke ¾in. to 4¼in. Bed area 35¼in. × 24¼in. Depth of throat 12¼in.

ALL ARRANGED FOR MOTOR DRIVE 400-440/3/50.

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SONS & COMPANY LIMITED
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MIDLAND

HERBERT O Capstan. Bar feed and tooling.

WARD O.E. Capstan. Bar feed and tooling.

WARD 7 Capstan. Bar feed and tooling.

HOLBROOK 9in. Lathe. Taper turning, etc.

PROGRES 20in. by 9ft. b.c. Gap Bed Lathe.

BROWN & SHARPE No. 2 Universal Grinder.

BIERNATZKI F.W. 2A Horiz. Miller. Table 55in. by 14in.

HERBERT 2I Combination Turret Lathe.

WEINGARTEN 4ft. 6in. by ¼in. Swing Beam Folder.

CRAIG & DONALD 10ft. by ¼in. Swing Beam Folder.

BUTLER 12ft. by 5ft. by 5ft. Planer. Three toolboxes.

KOLB 4ft. Radial Drill. Box Table.

ASQUITH 4ft. 6in. Radial Drill. Box Table.

G.S.P. 6ft. Radial Drill. Box Table.

CINCINNATI 1/18 Production Miller.

KEARNS No. 3 Horizontal Borer.

DALE 10in. by 5ft. 6in. S.S. & S.C. Lathe. Well equipped

CHURCHILL REDMAN Double Ended Centring Machine. 6ft. between heads.

CHURCHILL REDMAN 12in. Facing and Boring Lathe. 40in. in gap. Taper turning.

ORMEROD 22in. Heavy Duty Shaper.

THE MIDLAND MACHINE TOOL CO
BRADLEY, BILSTON, STAFFS. Bilston 42471/7

NEWALL USED MACHINE DIVISION

One Newall No. 1 Jig Borer to the following brief specification.

TABLE: 36in. by 24in.
SPINDLE NOSE TO TABLE: 32in.
QUILL MOVEMENT: 9in.

Fully rebuilt and guaranteed. Supplied with complete electrial equipment including control cabinet and motors suitable for 400 volts 50 cycles 3 phase.

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TAYLOR & CHALLEN 8.3 Inclinable Power Press, 40 tons pressure, 2in. stroke, with roll feed and tie rods.
TAYLOR & CHALLEN No. 1220 Inclinable Power Press, 20 tons pressure, 3in. stroke. With automatic guards.
TAYLOR & CHALLEN No. 1220 Inclinable Power Press, 20 tons pressure, blanking stroke ¼in.
TAYLOR & CHALLEN 8.1½ Non-inclinable Power Press, 10 tons pressure, blanking stroke ¼in.

4/6, Minerva Road, Park Royal, LONDON, N.W.10.
Telephone: ELGar 4841-4842.

30in. Archdale Vertical Column Drilling Machine with quick-acting compound table. Flange-mounted motor, 5 h.p. 400-440/3/50. Speeds 60-1,500 r.p.m. Spindle bored No. 5 M.T. Post-war machine.—LEE & HUNT, LTD., Crocus Street, Nottingham. Tel.: 84246.

Sciaky Type RAMC 2/40 Circumferential or End Seam Pneumatic Welding Machine for sale. Specially suitable for welding the ends of cylinders or drums and for straight runs. Pneumatic electrode pressure. Bottom electrode wheel driven in either direction with variable speed chain drive. Nominal rating 40 K.v.a. Capacity two thicknesses of 18 s.w.g. Welding speed from 2 to 9ft. per minute. Depth of throat 14¼in.—Photo, etc., from F. J. EDWARDS, LIMITED, 359-361, Euston Road, London, N.W.1, or 41, Water Street, Birmingham, 3.

Classified Advertisements (*PLANT FOR SALE, contd.*)

NEW MACHINE TOOLS FROM STOCK

GRANOR OF HALIFAX 11in. Gap Bed Lathe, by 8ft. 0in. b.c. Hole in spindle 3¼in. dia. 400-440/3/50

MITCHELL OF KEIGHLEY 8½in. Gap Bed Lathe by 5ft. 3in. b.c 400-440/3/50.

MITCHELL OF KEIGHLEY 10½in. Gap Bed Lathe by 5ft. 5in. b.c. 400-440/3/50.

MITCHELL OF KEIGHLEY 12½in. Gap Bed Lathe by 6ft. 9in. b.c. 400-440/3/50.

EXCEL No. 3/12 Hydraulic Horizontal Spindle Surface Grinding Machine. Capacity 24in. by 8in. Coolant equipment Motorised 400-440/3/50.

VICTORIA V2 Vertical Milling Machine. Spindle speeds 32-1,050 r.p.m. Table 45in. by 11in. Table traverse 29½in. 400-440/3/50.

VICTORIA U2 Universal Milling Machine. Spindle speeds 30-1,010 r.p.m. Table 45in. by 11in. Longitudinal traverse 30in. 400-440/3/50.

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DEAN, SMITH & GRACE 12in. Gap Bed Lathe by 3ft. 6in. b.c. 400-440/3/50.

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QUICKWORK No. 321 Motorised Rotary Shearing Machine with circle cutting attachment. Arranged motor drive for 400-440/3/50. Capacity 14 s.w.g. mild steel. Cuts circles from 6in. to 60in. diameter. Weight approximately 18 cwt.

BRADLEY & CRAVEN Power Geared Open Ended Guillotine Shearing Machine. Undercrank type. Capacity 84in. × ¼in. Gap in open ends 4½in. Fitted with automatic sheet hold-down and adjustable gauges.

BARHOPE Power Operated Double Geared Open Ended Guillotine Shearing Machine. Overcrank type. Arranged motor drive for 400/3/50. Capacity mild steel 4ft. × ¼in. Weight approximately 50 cwt.

BESCO High Duty Double Geared Guillotine Shearing Machine. Overcrank type. Model R. Capacity 120in. × ¼in. mild steel. Treadle operated clutch. Arranged motor drive for 400-440/3/50. Depth of gap 6in. Weight approximately 110 cwt.

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359-361, EUSTON RD., LONDON, N.W.1
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WARD, HAGGAS & SMITH 60in. Surfacing and Boring Lathe. (Good condition.)
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HARRISON 7in. S.S. & S.C. £225
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SMALLPEICE Lathe, multi-tool production.
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Universal Engineers, Complete jobbing workshop—comprising 6in. × 3½ B.G.S.&S.C. Lathe, Hand Shaping Machine, sensitive pillar drill, grinder, welding and blacksmith's equipment, usual hand tools, benches, etc., ¾ h.p. and ¼ h.p. 230v. A.C. motors, the whole housed in portable wooden building approx. 15ft. × 11ft. Offers up to £150 considered.—Apply BULFORD LODGE, Heatherside, Camberley.

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Messrs. HENRY BUTCHER & CO., 73, Chancery Lane, London, W.C.2. Telephone: HOLborn 8411 (eight lines).

SITUATIONS VACANT

If you do not wish your reply to any Box No. advertisement in this section to be forwarded to certain firms, please advise us. Your reply will then be destroyed, but you will not be notified as this would disclose the identity of the advertiser.

THE POLYTECHNIC, 309 REGENT STREET, W.1.

CIVIL AND MECHANICAL ENGINEERING DEPT.

Applications are Invited for the post of CHIEF LABORATORY TECHNICIAN. Experience in the installation, use, maintenance and repair of engines and hydraulic machinery is desirable. This post could be suitable for an ex-Service engineer.

Salary, £607 10s. by £30 to £727 10s. per annum. Proficiency increments are also possible beyond the scale.

Apply by letter, giving details of age, experience, etc., to the SECRETARY.

Estimator for Job Costing Young man of 25/30 years required, preferably with experience of automatic screw machine layouts.—DAVIS & TIMMINS, LTD., Billet Road, Walthamstow, E.17. LARkswood 2313.

Works Manager Required by well-established company within 50 miles of London, for expanding works with approximately 150 employees, engaged on the production of Cutting Tools and Machine Tool components.

Applicants must be trained engineers with previous experience of Works Management, Work Study and the batch production of Threading Tools.

Superannuation Scheme. Assistance with housing if required.

Replies, stating age, experience and salary required, to BOX Z734, MACHINERY, Clifton House, Euston Road, N.W.1.

Setter Improver Wanted for Swiss type automatics. N.W.10 area.—BOX Z756, MACHINERY, Clifton House, Euston Road, N.W.1.

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Classified Advertisements (*SITUATIONS VACANT, contd.*

SANDVIK SWEDISH STEELS LIMITED invite applications for the position of Foreman, in charge of the special tool making section. This is an important part of our rapidly expanding business, and only applications from trained men can be considered. The following conditions require to be fulfilled:—

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Position will be staff and pensionable. Ideal working conditions in modern well-equipped factory.

Apply in writing, stating full particulars, to:—Ref. PI/I, SANDVIK SWEDISH STEELS, LTD., Manor Lane, HALESOWEN, Birmingham.

Highly Paid, Secure and Interesting posts are always available for technically trained men. Find out how you can put some letters after your name by preparing at home on "No Pass—No Fee" terms for A.M.I.Mech.E., A.M.I.Prod.E., A.M.S.E., City and Guilds, etc., etc. Full details of exams and hundreds of courses in all branches of Engineering, Draughtsmanship, Management and Automation Techniques, the benefits of our Employment Dept., and unique record of 95 per cent. successes are given in "Engineering Opportunities"—a valuable 148-page Guide which will reveal many chances you are now missing.—Write for your copy today (stating subject of interest)—FREE and without obligation, B.I.E.T., (Dept. 34a), 29, Wright's Lane, London, W.8

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Required for factory in the West of Scotland, at present engaged in light Mechanical and Structural Engineering.

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Contributory Pension and Free Life Assurance schemes in operation. This position gives scope for further advancement with an expanding organisation. Reply, giving full particulars of previous experience in chronological order, together with details of technical training, to **BOX Z764, MACHINERY, Clifton House, Euston Road, N.W.1.**

Draughtsman Required, Experienced in the design of press tools for the mass production of precision pressings. Must have good knowledge of follow-on tools. Experience on Multi-slide machine an advantage. High salary is offered to Draughtsman with this experience.—BOX Z748, MACHINERY, Clifton House, Euston Road, N.W.1.

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Classified Advertisements (*SITUATIONS VACANT, contd.*)

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A well-known Engineering Company in the West of Scotland are, at present, undergoing internal re-organisation to improve their facilities and equipment prior to expansion.

There is a vacancy for a General Foreman to manage the Machine Shop and Toolroom, and applications are invited from suitable candidates not over 40 years of age, who must possess initiative and who are seeking a position with prospects for promotion.

Preference will be given to those with proved organising ability, a sound technical training and the capability of retraining and instructing adult operators. Contributory Pension and Free Life Assurance Schemes in operation.

Reply, giving full particulars of previous experience in chronological order, together with details of technical training to **BOX Z763, MACHINERY, Clifton House, Euston Road, N.W.1.**

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Apply in writing
to Managing Director,
WADKIN LIMITED
Green Lane Works,
LEICESTER

Freelance Agents Required for the sale of well-introduced machine tools and workshop equipment in all areas except Birmingham and Yorkshire. Liberal commission and mileage allowance. Workshop experience required, car owner preferred.—BOX Z445, MACHINERY, Clifton House, Euston Road, N.W.1.

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EXPERIENCED SENIOR SALES REPRESENTATIVE

Full engineering training essential. Must be fully competent to discuss engineering details and applications of presses. Necessary be well introduced with major press users, including contacts highest level. Write, in confidence, giving full details, qualifications and experience to:

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Clifton House, Euston Rd., N.W.1.

Yorkshire and Staffordshire Livewire Agents required immediately by Progressive Company in the North Eas't. Manufacturers of Precision Gauges, Jigs and Fixtures, Special Purpose Machines. Youthful and energetic approach is essential.—Applications in strict confidence to BOX Z758, MACHINERY, Clifton House, Euston Road, N.W.1.

Representatives Required by manufacturers of Machine Tools, jigs, press tools, plastic moulds and special machines, London and home counties, areas North and South of Thames. Generous commission. Give details of experience, age, etc. Freelance considered if handling non-conflicting product.—BOX Z782, MACHINERY, Clifton House, Euston Road, N.W.1.

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Chief Inspector Seeks Appoint- ment in London area. A.I.D., A.R.B., I.E.M.E. Approved.—BOX Z709, MACHINERY, Clifton House, Euston Road, N.W.1.

Showroom and Warehouse Mana- ger, fifteen years control English and Foreign Machine Tools and accessories. Sales promotion, technical German, seeks position with prospects.—BOX Z752, MACHINERY, Clifton House, Euston Road, N.W.1.

Young Englishman, Well Edu- cated, 18½, trained in large German machine tool factory, all shops and service, wishes to take a position with English company leading to sales executive position. Has very fluent technical German, and can demonstrate and service.—BOX Z778, MACHINERY, Clifton House, Euston Road, N.W.1.

Design Consultant, 48, Special Purpose Machinery and similar, seeks regular (full or part time) employment. Specialising in designing, Manufacturing and Demonstrating of whole job.—BOX Z776, MACHINERY, Clifton House, Euston Road, N.W.1.

Production and Mechanical Engineer experienced in design special purpose machines, modification or redesign of machine tools, automotive design and production gas turbines, heavy engineering, etc.—BOX Z722 MACHINERY Clifton House, Euston Road, N.W.1.

Chief Engineer/Works Manager, A.M.I.P.E., age 48, experienced in electrical mechanical and pnuematic engineering. Introduction of new lines covering all aspects of development and manufacturing methods, etc. Extensive knowledge of automatics, special purpose machinery. Experience of production methods in U.S.A.—BOX Z781, MACHINERY, Clifton House, Euston Road, N.W.1.

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PLANT WANTED

Universal Modern Grinding machine. Capacity approximately 10in. × 36in. Must be in first class condition.—Write BOX Z773, MACHINERY, Clifton House, Euston Road, N.W.1.

5-tool Bechler Automatics with attachments. Please state type and serial numbers.—BOX Z774, MACHINERY, Clifton House, Euston Road, N.W.1.

Wanted: 8½in. Centre × 8ft. Gap Bed—all geared head. Must be in first class condition and guaranteed.—BOX Z783, MACHINERY, Clifton House, Euston Road, N.W.1.

Wanted, Wheel Press, 400/600 tons capacity to admit 8ft. 0in. between tie-bars and 8ft./12ft. between ram and resistance head. Condition not important. Any suitable Press considered.—BOX Z785, MACHINERY, Clifton House, Euston Road, N.W.1.

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Capacity for Precision Work available. Centre lathe turning, milling, grinding, and fitting.—BLAGDON ENGINEERING CO., Blagdon, Seaton Burn, Northumberland, near Newcastle-on-Tyne. Telephone: Stannington 243.

INDEX TO ADVERTISERS

(Continued on page 194)

INDEX TO ADVERTISERS—(*continued from page 193*)

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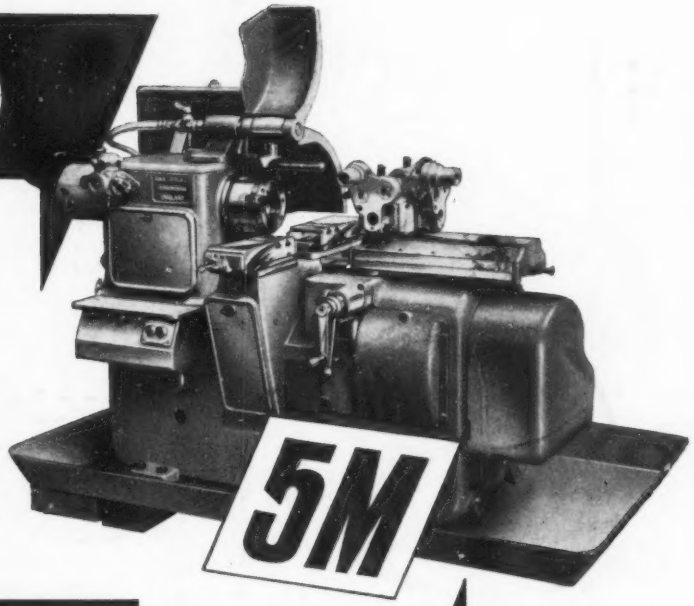

5M **Maximum swing 7¾". Swing over cross slides 6⅝". Independent motors for spindle drive and rapid motion to turret and cross slides. Wide range of speeds with three automatic changes. Suitable for small batch work.**

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FULLY AUTOMATIC apart from chucking. Air chucking is available in the range of additional equipment

445

	5M ins	5M mm	95 ins	95 mm
Maximum swing	7¾	197	12½	317.5
Maximum swing over cross slides	6⅝	168	10¾	273
Cross slides stroke	2¾	70	4	101.6
Cutting travel of turret	4⅜	111	5¾	146
Number and range of spindle speeds	21 FORWARD 14 REVERSE		30	
	58 to 1458 r.p.m.		40 to 834 r.p.m. or 60 to 1220 r.p.m.	
Horse power of main motor	4½		10	

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